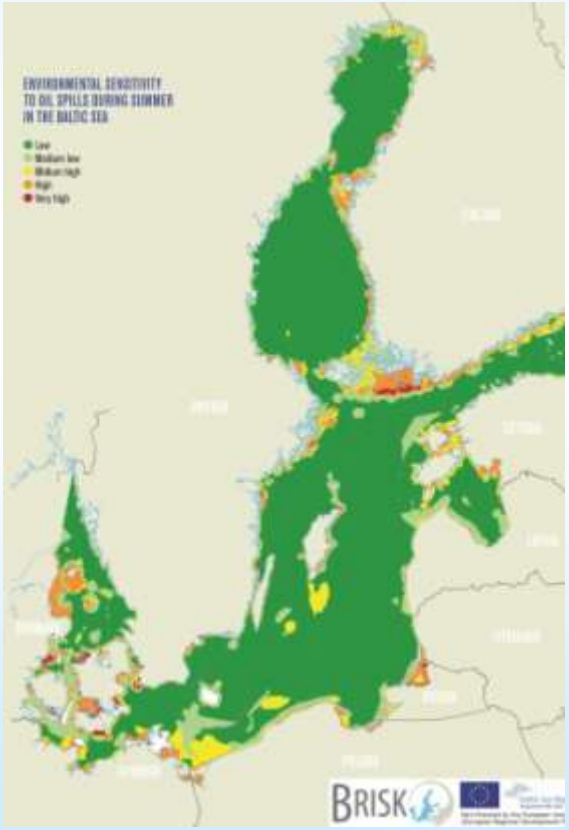
Step 3: Development of Integrated vulnerability maps



Ward Van Roy
MUMM/RBINS (BE)

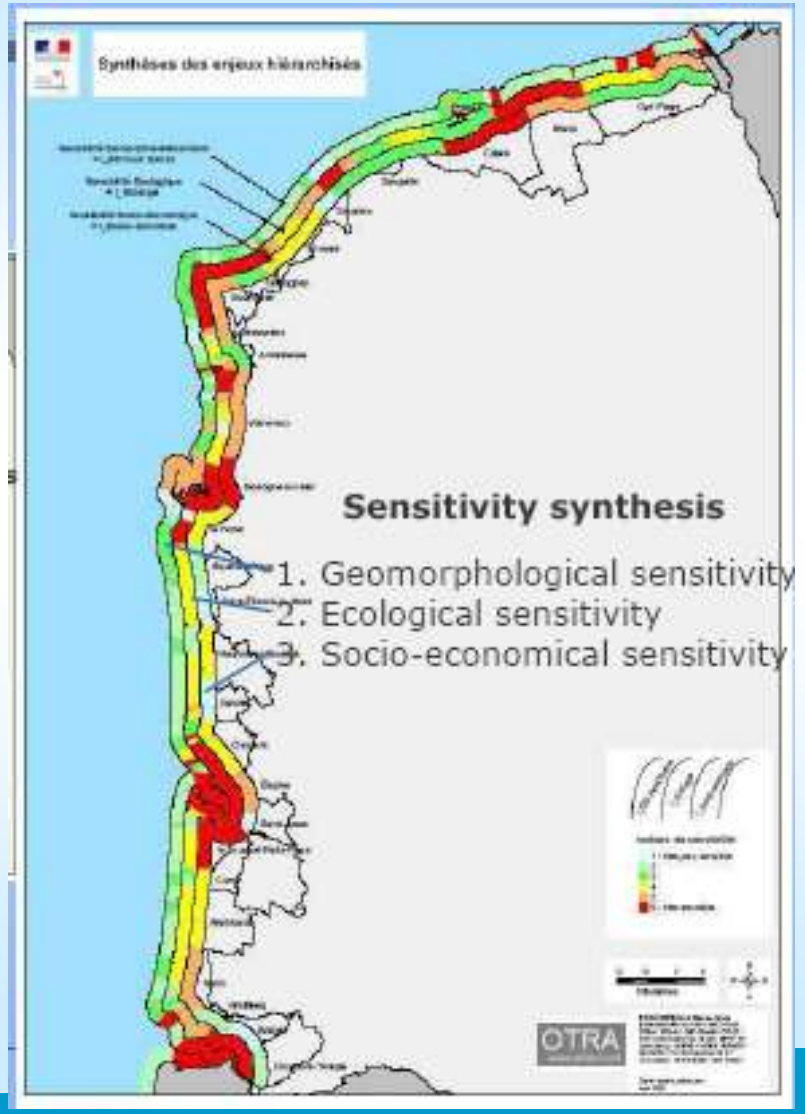
Contents

Introduction

- RISK DAMAGE = PROBABILITY x VULNERABILITY
- Integrated (Total) or separated vulnerability
- Integrated vulnerability = combination of all features (cfr. NO, UK)
  - Ecological and Socio-economic combined
- Separated vulnerability (cfr. FR)

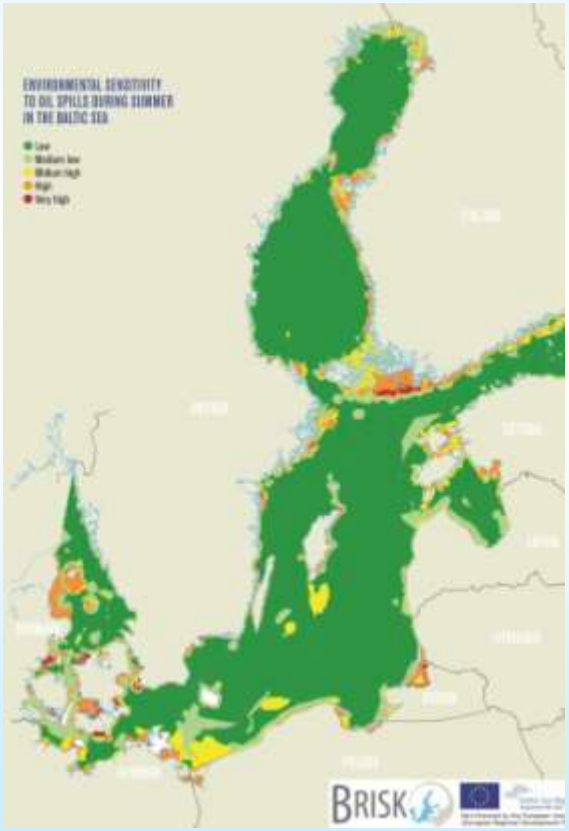
  Socio-economic ⇔ Ecologic
- BE-AWARE: combination
  - Separate vulnerability maps (socio-economic + ecological)
  - Integrated vulnerability maps
    - Balance between ecologic and socio economic features
    - Basis for damage maps
    - Different possible approaches

Integrated versus separated



Ecological vulnerability map

- BRISK (~ environmental sensitivity)
- Seasonal Features layers = ranked (score 1-5)
- Additive model (sum of all feature layers)
- 4 seasonal vulnerability maps (score 0-40)
- Reclassified (5 levels)
  - Equidistant scale (DK)
  - Linear increasing scale (BRISK)
  - Spreading
  - Expert input
- 1 Deeper water vulnerability map (<20m)



Socio economic vulnerability

- Seasonal Features layers = ranked (score 1-3)
- Additive model (superposition of all feature layers)
- 4 Seasonal socio-economic vulnerability maps
- Reclassification
  - 3 levels
  - Equidistant scale or linear scale
  - Expert input
- 1 Deeper-water socio-economical vulnerability (<20m)
  - Deeper water fisheries (lobster, …)
  - Mineral extraction
  - Problem with offshore fisheries (occur in complete water column)

Integration: an overview of the possibilities

- Different approaches
  1. Equality between EC en SE (~BRISK)
  2. Ecosystem preference by correction scores (~NO approach)
  3. Highest rank approach on EC and SE maps
  4. Sum of EC (0-5) and SE (0-3) vulnerability maps

- Expert input

- Separate deeper-water scenario (<20m)

Approach 1. Equality between EC en SE (BRISK)

- Ecological and socio-economical are complementary
- Same max score (5) for EC and SE vulnerability feature layers
- Sum of all features layers both EC and SE (additive model)
- Reclassification (0-5)

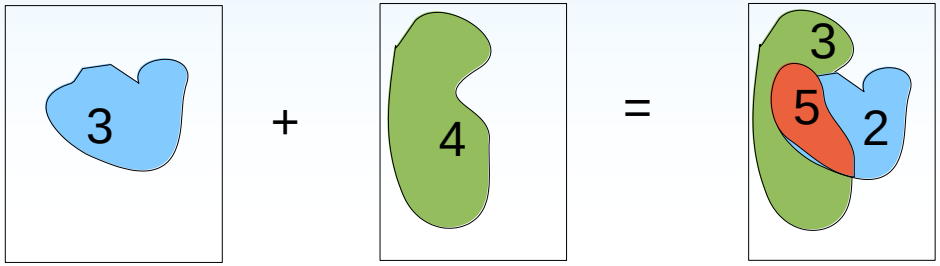
☺ Simplicity

☹ Risk of loosing highest vulnerability scores

☹ Requires perfect complementarity between EC and SE

☹ Risk of undervaluing EC or SE

Sum of feature layers



Reclassification

Approach 2: Ecosystem preference by correction scores

- Variation on Approach 1
- Use correction factor to recalculate feature scores
  - Features that can not be compensated
    →correction factor (e.g. x2)
  - Natural features
    →correction factor (e.g. x2)
- Additive model on all features

☺ Focus on ecosystem

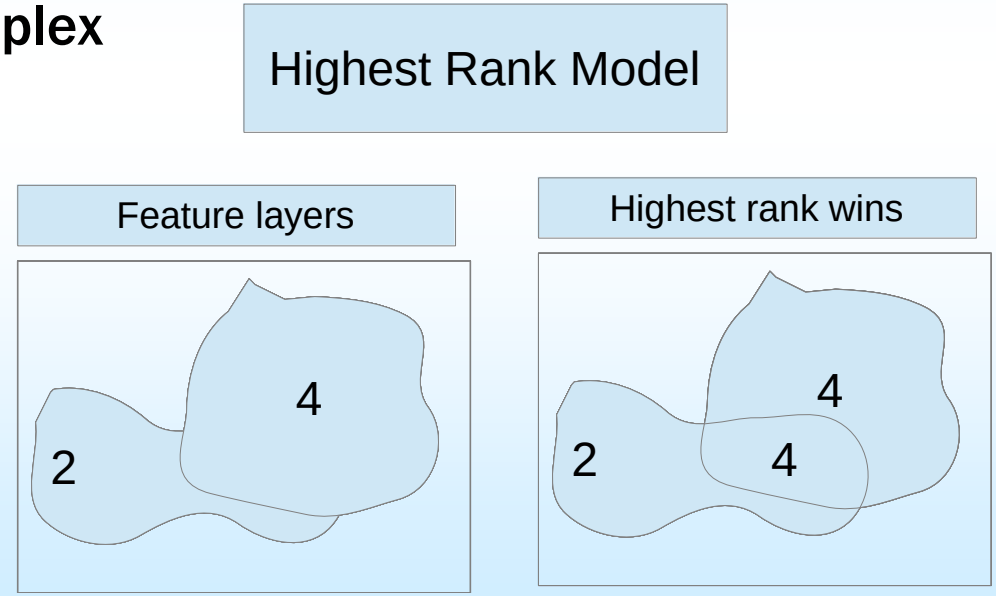
☹ Complex

Approach 3: Highest rank replacement model

- based on total EC and SE vulnerability maps
- No complementarity between EC en SE
- No sum but only highest sensitivity rank is used

☺ No risk of loosing highest sensitivity areas due to averaging

☹ Complex



Approach 4: Sum of EC (1–5) and SE (1–3) vulnerability maps

- Different max scores for EC and SE vulnerability maps

  Ecological: 5 ⇔ Socio-economical: 3

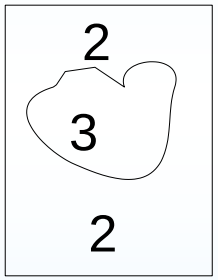
- Additive model
- Reclassification

☺ Focus on EC vulnerability

☺ Simple

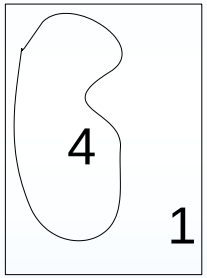
☹ Risk of losing high sensitive areas due to averaging

SE vulnerability



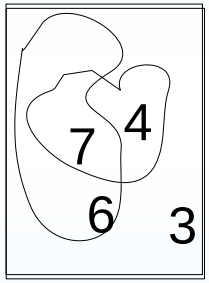
+

EC vulnerability

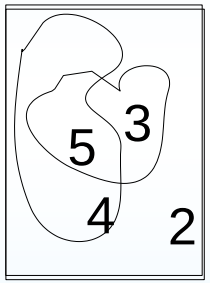


=

Sum



Reclassification



Deeper water scenario

- Separate annual EC and SE vulnerability map
  - No pronounced seasonal variation = Simplification
  - Deeper water ecologic features
  - Problem with feature that occur in both surface as deeper water (i.e. offshore fishery)
  - Integration of EC and SE deeper water vulnerability
- Risk for damage

= (Probability blow out + Probability oil entrainment to deeper water)

x Deep sea vulnerability (EC)

- Due to lack of time and difficulties the development of this scenario (SE) is moved to the next phase of the project

Conclusion

- No optimal solution (yet)
- GIS data and feature maps are needed first
- Expert advise during mapping and reclassification
- Deep-sea scenario (1 map?, What about fisheries,)

  → Moved to next phase
- More debate is required

■ ■ ■ ■