Vulnerability of Svalbard coasts to oil spills – climate change consideration

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1988 – 1990 Tidal Zone Project AKUP – Norsk Polarinstitutt – Institute of OCeanology PAS



Deliverables

- Methodology for intertidal zone vulnerability assessment (DNV)
- Data base materials (NPI, IOPAN, MARBEF- OBIS)
- Six scientific papers (Polar Biology, Est. Coastal Shelf Sci, Sarsia, Oil Spill Technology)









Fig.1 Sampling stations in the littoral of Bjornoya. July 1994 Circles denote macrofauna samples, squares meiofauna samples and triangles dredgings in sublittoral.

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1993 - Bjornoya & 1994 - Hopen
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Fig.3 Sampling stations.











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Zoogeographical border in the intertidal - 1988











intertidal Atlantic – red – Gammarus oceanicus Arctic – blue – Gammarus setosus Black – absent

Physical parameters

- Principal (X6)
- Type of the shore
- wave exposure
- Important (x 3)
- type of the substrate
- sediment flux
- ice cover duration
- ice cover type
- -weathering potential
- - stranded kelp on shore
- water transport

- Vulnerability
- E.g. shore type
- 1 (low) cliffs with deep shelf
- 2 (medium) cliffs with shallow shelf, low beaches
- 3 (high) tidal flats, sheltered rock pools

Biological parameters

- Principal (X6)
- key species presence
- Important (x 3)
- recovery potential
- macrophytes cover
- amphipod density
- resettelment potential

Secondary (x 1)

- supply from sublittoral
- export to sublittoral
- bird moulting, haul out, feeding ground

- Vulnerability
- E.g. recovery potential
- 1 (low) area of fast growing organisms
- 2 (medium) mixture of r and K strategists
- 3 (high) area dominated by slow growing K - strategists







Fig.11 Hopen coasts vulnerability to oil spill.





Fig.1 Percent share of major taxonomic groups in macrobenthos biomass in the investigated localities

Climate related changes in intertidal



- Less ice foot & fast ice
- Storminess (effective waves exposure)
- Increased sediment transport +
- More organic substrate on the shore +
- New intertidal species
- Higher macrophyte biomass \$\frac{1}{2}\$ \$\frac{1}{2}\$
- Expansion of Atlantic community
- Coastal change on the expense of glaciers $\ddagger \ddagger$

 $\star \star \star$

- More shore birds ?
- More meiofauna biomass ?