Decision Aid for Munitions Management
Klaipeda Meeting
DAIMON

Interreg
Baltic Sea Region
Situation of Baltic Sea dumped munitions
3.1 History and Current Status

Degradation Products
3.1 History and Current Status
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Bottom Currents
3.2 DAIMON Project

Impact assessment

Biomarkers  Chem/tox

Pilot assessment

Conventional  Chemical

Remediation options

Risk  Costs
• Budget shift Submitted
• Platforms & Extension
• Cooperation with other projects
• WP4 change
  – IDUM removed
  – AWI as coordinator
Methods

- Munition Status Examination
- Modelling of possible release
- Pollution of sediments and water
- Impact on biota assessment
- Risk categorization procedure
WP2 Status

• Methods
  – Tests completed
  – Samples collected & sent
  – Waiting for results
  – Passive samplers
  – Toxicity
Particular tasks

- IOPAS MeHg, HR Model
- MUT, VERIFIN, FFI – Methods, analyses, Age of leakage (MUT), Model leakage (FFI)
- PNA, TUC - Archive study, unmapped munitions
- MIG – faster deployment, on-site evaluation
- AWI, Ti-Fi, SYKE – impact on biota, toxicity
- Chalmers – benthic fluxes
Munition Identification

Figure 1

Figure 2

Figure 3
Wp2.1 marine munitions status

- Led by PNA
- 2.1.1 Identification:
  - in-situ methods
  - Archive research
- 2.1.2 Corrosion estimation: Exposure, NAA, photos
- 2.1.3 Composition: Neutron Activation Analysis
Modelling of contamination
Task 2.2 Modeling of contamination

- Led by PNA
- Leakage rate
- Transport Modelling
- Map of potentially contaminated areas
Pollution of sediments and water

Metals

Chemical Warfare Agents

Explosives

Hg

As

Pb

Mercury
Arsenic
Lead

200.59
74.9216
207.2

Cl-S-S-Cl

OH-S-S-OH

H2N

HN

NO2

NO2

NO2

O2N

O2N

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2.3 Sediments & 2.4 Water

• Led by VERIFIN
• Toolbox for measuring warfare agents' pollution in sediments & water
• Age of Leakage & Passive samplers
Impact on biota

Types of habitats

- Mussel
- Fish
- Infauna

A5.2 - Sublitoral Sands
A5.4 - Sublittoral Mixed Sediments
A5.5 - Sublittoral Macrophyte-Dominated Sediment
2.5 Impact on Biota

• Laboratory and in situ studies (including caging studies)
• Analyses
• Biomarkers
• VRAKA application
• Food web model
2.6 Risk categorization

2.6.1. lists of risk chemicals and their categorisation,

2.6.2. leakage scenarios and their categorisation,

2.6.3. Categorisation of factors affecting the spreading of the chemicals in different conditions,

2.6.4. Linking of risk chemicals with their possible effects on biota,

2.6.5. Development of scenarios leading to possible human exposure,

2.6.6. Building a risk categorisation procedure based on the developed lists and scenarios.
WP3 pilots

- Cruises
- Analysis
- Verification of Risk Assessment procedures
WP4 Management strategies for marine munitions

• procedures, environmental costs and economic impact
• Different approaches
  – Legal limitations
  – Environmental impact
  – costs
WP4 tasks

• IO PAN costs of ecosystem services, impact of management strategies on the marine ecosystem.
• TUC guidelines for the handling, transport and destruction (mobile and stationary).
• MIG consequences for offshore and MSP
• TIFI commercial fish stocks. Risk for humans
• Chalmers calculations/estimations of loss of ecosystem services
Remediation options

- Costs
- Environmental impact
- Legal considerations
- Decision support tool

Interreg Baltic Sea Region
Tasks WP4

• A 4.1 Cost/benefit analysis of different management strategies
• A 4.2 Technical guidelines
• A 4.3 Legal aspects of marine munitions’ management
• A 4.4 Safety risk for humans
Data interpretation

- Risk levels
- Binary or scale

- Explanation
- Knowledge based

- Weight – for overall risk
- Geographical extent
WP5 Decision support

- A 5.1 Development of software/database for munitions classification
- A 5.2 Development of the decision-aid software
- A 5.3 Demonstration of the decision-aid software
A 5.3 Demonstration of DSS

- 1. Gulf of Finland – Finland and Estonia
- 2. Skagerrak NO – Norway
- 3. Måseskär – Sweden
- 4. German coastal waters – Germany
- 5. Bornholm Deep – Denmark
- 6. Gdańsk Deep – Poland
WP5 outputs

- Specialist software/database for munitions classification
- DSS
- Best practice collection on management options for Baltic marine munitions
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