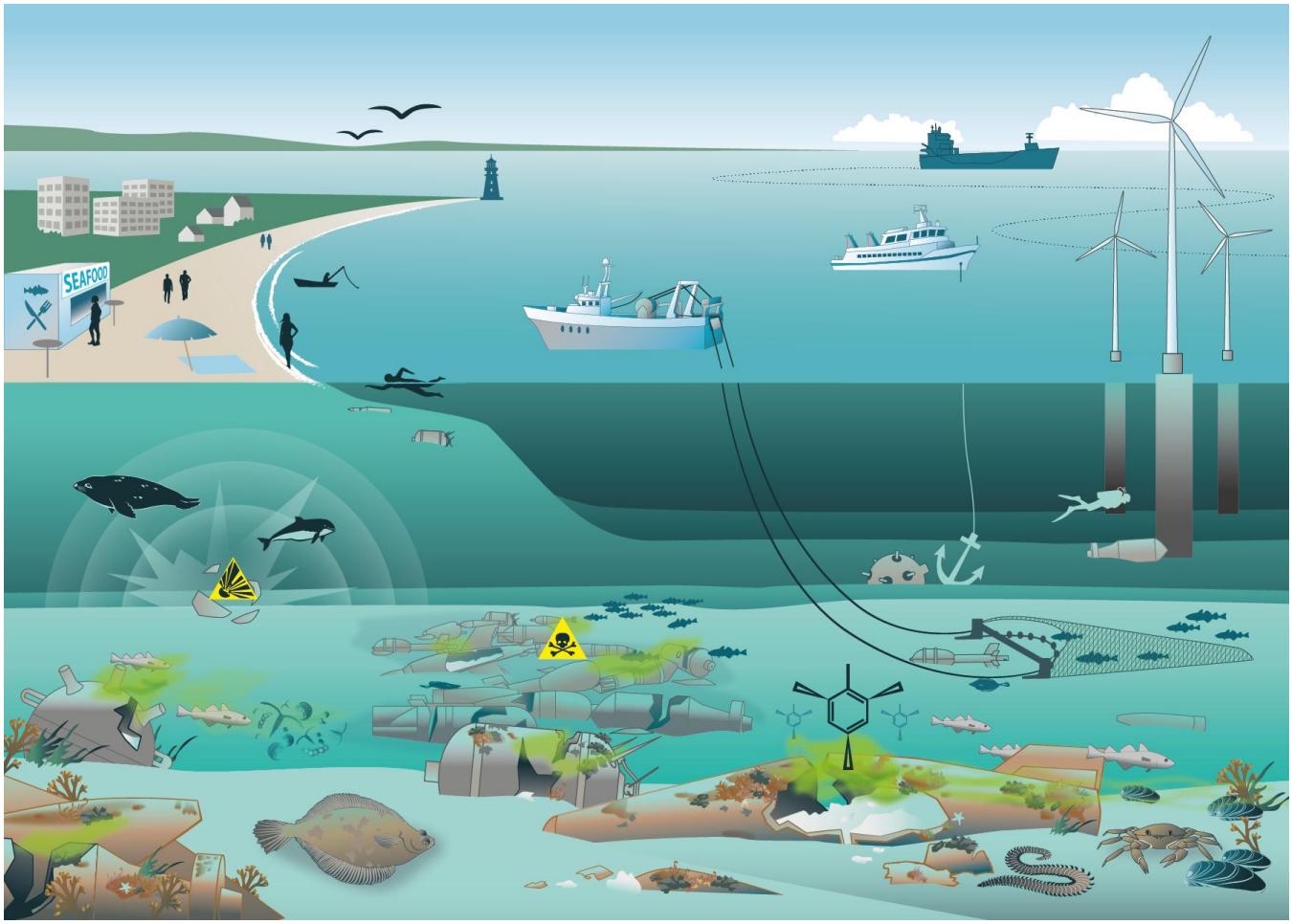
THE PROBLEM

Around 1.6 million tonnes of unused ammunition were dumped in German coastal waters after the 2nd World War. Around 300,000 tonnes of this ended up in the Baltic Sea, while 1.3 million tonnes were dumped in the North Sea. The majority of this was conventional (i.e. explosive) munition. The proportion of chemical munitions dumped in German waters is relatively low, at approximately 5,000 tonnes. The first scientific studies to investigate the environmental impact of ammunition in the Baltic Sea were carried out in 2010. After more than 80 years on the seabed, many casings are corroding. Carcinogenic and mutagenic pollutants known as explosive-typical compounds (ETCs), such as trinitrotoluene (TNT) and its derivatives 2- and 4-ADNT, are entering the marine environment. These can be absorbed by marine fauna and affect the health and reproduction of these organisms. Since 2023, the German government has provided €102 million (BMUKN) for a pilot programme to tackle the recovery and disposal of old munitions. The first pilot clearance started in September 2024. CONMAR partners support the programme by providing scientific expertise and working closely with the clearance companies and project managers involved. CONMAR also collaborate with various stakeholders, including the federal government, state governments, industry, civil society, environmental associations, and international scientists.



Infographic: www.thiele.illustration.de

Since 2010, CONMAR members have been conducting intensive research into munitions in the sea, starting with UDEMM and the Interreg projects DAIMON I & II and North Sea Wrecks. This was followed by further projects focusing on developing technologies and workflows for handling and recovering munitions, such as TATTOO, BASTA, ExPloTect, ProBaNNt, REMARCO, SAM, ValidITy, BALTWRECK and AMMOTRACe. These projects have identified environmental hazards and developed chemical analysis devices and intelligent autonomous underwater vehicles (AUVs), among other things. EU-funded projects such as MMinE-SwEEPER and MUNI-RISK focus on developing the necessary technologies further. Both MUNIMAP and BALTWRECK are developing comprehensive

roadmaps for dealing with munitions and dangerous wrecks in the sea, including the relevant legal aspects. Additionally, a dialogue is being established between European stakeholders to assess the needs and legal approaches to explosive ordnance disposal. Since 2025, the latest project, CAMMera, has been working on the industrial-scale disposal of munition from dumping sites.

What we know

- TNT and its degradation products are absorbed and metabolised by marine organisms, e.g. mussels and fish.
- Munitions are also found in large quantities outside designated dumping areas.
- All water samples taken from the Baltic Sea contained explosives compounds (detection limit 0.1 ng/L).
- The main sources of the extremely high levels of RDX and DNB (also explosives) contamination in the Bay of Lübeck are corroding Fieseler Fi 103 warheads, also known as “V1” under the Nazi propaganda name.

RESULTS from CONMAR 1st PHASE

Several results are directly relevant to further action regarding the long-term clearance of the German Baltic and North Seas. These include:

- Creation of a unique database on the occurrence of munitions and the distribution of ETCs in German seas
- Development of a tool for multi-criteria decision analysis and prioritisation of munitions clusters for clearance, taking stakeholder needs into account.
- Evidence of ETC uptake by organisms examined and development of environmental quality standards for TNT in water and biota.
- Identification of specific bioindicators for future risk assessments.
- Development of hydrodynamic models for the distribution of dissolved and solid explosive components.
- Analysis of institutional frameworks and conflicts between stakeholders to identify the political and social prerequisites for successful munition management.
- Start of characterisation of the hotspot of munitions contamination in the North Sea (Jade Bay and Outer Jade).

Thus, CONMAR provides comprehensive interdisciplinary knowledge, from field investigations and laboratory experiments to decision-making and data tools. The project had a decisive influence on the selection of ammunition dumps to be cleared as part of the German emergency programme in the Bay of Lübeck. CONMAR will also contribute to the development of a sustainable management concept for ammunition contamination in the German North Sea and Baltic Sea in the future.

THE PARTNERS

The CONMAR partners bring together almost all of the centres and institutes in Germany involved in marine science research on munitions.

AWI Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung	Biological effects	Thünen	Fishes
GCF Global Climate Forum	Governance-Analyse, Stakeholder dialogue, Transdisziplinarity	UKSH Universitätsklinikum Schleswig-Holstein	Toxicology and risk assessment
GEOMAR	Coordination, Mapping, Chemical analysis, Stakeholder dialogue, Data management.	Umwelt Bundesamt	(Eco) toxicology and risk assessment
IOW Leibniz-Institut für Ostseeforschung Warnemünde	Oceanographic modelling	Universität Rostock Traditio et Innovatio	Sediment and munition transport
SENCKENBERG world of biodiversity	Benthos and habitat mapping		