

RESPONSE

Building Response Frameworks under existing
& new Marine Pollution Challenges in the Black Sea



Milestone 7

First training course outline completed



Co-funded by
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Project background and context

The RESPONSE, supported by the European Union EMFAF, under Grant Agreement no 101124661 has duration of 36 months, starting from 01.10.2023. The project consortium involves six partners from five different countries: Greece, Bulgaria, Romania, Ukraine and Georgia. Five of the participants are based in countries bordering on the Black Sea, and the lead beneficiary, the Aristotle University of Thessaloniki (AUTH), has a long history of working with the region and with members of the consortium. The partnership includes one university, two research institutes and three environmental NGOs: the Black Sea NGO Network (BSNN) regional NGO network based in Varna, Bulgaria; the National Institute of Marine Research and Development (NIMRD), based in Constanta, Romania, leading research institute for the Black Sea; the Institute of Market Problems and Economic-Ecological Research (IMPEER), Odesa, a public institution, part of the National Academy of Sciences of Ukraine; the Black Sea Branch of Ukrainian Environmental Academy of Sciences (BSBUEAS) is Odesa-based NGO with a team of professional researchers; and the Greens Movement of Georgia / Friends of the Earth (GMG/FoE) – Georgia, an NGO, part of the international environmental network. All three beneficiaries from EU Member States have extensive experience in marine pollution projects under the Horizon 2020 and Horizon Europe programmes.

RESPONSE aims to identify and promote the development and establishment of new-generation advanced training schemes and curricula to support early warning, region-wide mechanisms for monitoring natural and man-made disasters. Various training programs, platforms and curriculum have been implemented to monitor marine pollution and ensure knowledge integration and dissemination. Still, training material, best practices, standards and protocols often differ among platforms and programs, hindering progress towards implementing an integrated, transdisciplinary and multidisciplinary marine pollution training system. Peculiar events, such as armed conflicts, create new environmental and societal challenges that call for international, coordinated responses.

RESPONSE acknowledges the importance of deeper understanding of marine ecosystems and river-delta-sea connections, the need for development of harmonized procedures, standards and methodologies in marine monitoring across the Black Sea countries to support healthy and resilient seas and foster integrated marine governance. The sustainable changes that are required for the establishment of efficient, advanced training schemes that would be integrated with the challenges, goals and specificities of the scientific and social context and make the most of the untapped capacity of stakeholders to promote regional awareness in the field.

In view of the background and context described above, the four overarching objectives of RESPONSE are: 1) IDENTIFY and UNDERSTAND the institutional and societal gaps and needs for effective, integrated, transdisciplinary and multidisciplinary marine pollution training systems; 2) DEVELOP effective training programs by assembling, integrating, and improving the most promising approaches and results into a comprehensive framework that consists of a set of methodological training tools, databases, policy recommendations, and background information; 3) SUPPORT the implementation of the EU and Regional Strategies, by developing operational guidelines for effective application, updating, monitoring and management of training programs on marine pollution; 4) EMPOWER marine pollution training, monitoring and mitigation by involving, inspiring and influencing stakeholders through a broader vision of co-

Executive summary

This document presents an overview of the training courses on marine pollution preparedness and emergency response of the Black Sea partners developed under the RESPONSE Project. The ten interlinked steps of the training framework identified previously have been used to support the planning process. The national level training courses build on the research products and achievements of RESPONSE. They have clearly defined objectives, scope and focus on the pollution types of interest for the respective national audience. The key stakeholders, the needs assessment and the results of the collaborative co-creation process of designing the training courses are also presented. The selected modules are aligned with the prioritization performed at regional level while also integrating the national perspectives and preferences. The curriculum areas are aligned with the identified stakeholder needs. They also envisage the integration of scientific and digital tools, a focus of interest in all project countries. The development of training materials incorporates a diverse and comprehensive set of resources designed to support effective learning and practical application.

In line with the needs assessment, the training plans envisage the use of participatory tools and maritime incident reports to address the specific capacity gaps and involve stakeholders in integration exercises based on data instruments and marine pollution monitoring tools and integration of decision support systems. The training materials include manuals, handbooks, and other forms of structured guidance, as well as case studies of past marine pollution events to offer real-world context and lessons learned. Multimedia elements such as videos and interactive simulations are also included to enhance engagement and experiential understanding. In the framework of RESPONSE project, all training content will feature a digital component and be integrated with the RESPONSE Digital Toolkit, facilitating flexible, scalable, and user-friendly delivery across stakeholder groups.

The marine pollution exercises, simulations and assessment framework envisage the design of versatile and replicable exercise templates adaptable to different marine contexts and pollution scenarios. Teaching preparedness and response methods have been planned. They envisage adaptive and evidence-based instruction serving the dual purposes of prevention and emergency response with emphasis on preventive training, e. g. risk forecasting, policy planning, and preparedness strategies, emergency intervention, including system and hierarchy of rapid decision-making, operational coordination, and real-time response.

Contacts in the academia and technical sphere and involvement of qualified lecturers and experts will also help in ensuring the success of the training programs. Experts with practical experience in preparedness and response to maritime accidents and maritime will be invited to deliver instruction. Bringing the process of training and facilitation a step further and inviting highly skilled experts for "training of trainers" (ToT) sessions on national and regional level is envisaged to help build a sustainable pool of skilled facilitators within the project contacts, who can continue delivering the training beyond the initial phase. The evaluation and monitoring steps with specific indicators designed to assess performance-based achievements have been designed in correlation to the project KPIs and the impact of project training activities.

In view of sustainability and integration into broader systems, activities have been planned to encourage integration of the RESPONSE training content in contingency plans, practical exercises, stakeholder meetings, training and education, inclusion in networking events. To ensure the marine pollution training programs have a lasting and wide-reaching impact, they will be aligned with the training content and objectives of existing national emergency response and maritime

policies, ensuring consistency and support from relevant authorities. Additionally, establishing strong links with European Union mechanisms and regional Black Sea frameworks is envisaged to promote coordination and harmonization across borders, enhancing regional preparedness and response capabilities. The training outcomes and best practices should also be incorporated into the capacity-building components of related projects, creating synergies and reinforcing the overall effectiveness of marine pollution management efforts.

Through this set of marine pollution preparedness and emergency response national training courses, with a specific focus on pollution from armed conflicts, Milestone 7 builds on the co-creation participatory process within the RESPONSE project, further engages key stakeholders, supports the use of digital infrastructure and digital tools, promotes policy coherence and fosters regional frameworks, moving towards practical implementation of training courses with relevant training with programmes and objectives to effectively protect the Black Sea marine environment.

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Introduction

Milestone 7 is part of Task 3.1 Operation Plans on marine pollution training. The aim of the task is to develop Operation Plans on marine pollution training on a national level, so as to provide comprehensive capacity-building educational programs on a regular basis.

This document outlines the National operation plans on marine pollution training curricula of the Black Sea partners, using the comprehensive framework for the design and implementation of marine pollution preparedness and emergency response training, developed under the RESPONSE Project with a focus on the pollution caused by armed conflicts. The National operation plans are tailored to the specific stakeholder needs on national level. They are built around the logical steps described in the previous project documents particularly M6. The first operation plans on marine pollution training on a national level (T 3.1) prepare for the actual training to selected stakeholders on how to set-up, reach operational readiness and run training courses (T3.2). In pilot cases the testing and refining of the training curricula is performed in T3.3, allowing to test and refine the training curricula developed in the project.

1. The National Training Courses - First training course on National operation plans on marine pollution curricula_____

1.1 National Training course in Bulgaria: National operation plan on marine pollution preparedness and emergency response training

This training program aims at enhancing the preparedness and response capacity to address marine pollution incidents of the Bulgarian authorities and institutions.

The key points are the objectives of the training program, its geographical coverage, the types of pollution it will focus on and the participants in the training. The following steps are foreseen for the planning of a comprehensive marine pollution training in Bulgaria.

Purpose and scope of the training course

The following key objectives for training have been identified in view of the situation with preparedness and response to marine pollution incidents in Bulgaria:

• Objectives of the training course:

- to increase the understanding of local government units and civil protection authorities on their roles in marine pollution emergency response and post-incident recovery and enhance their capacity to address the issues;
- to train the staff of administrations, institutions and agencies involved in marine pollution preparedness and emergency response on specific marine pollution issues in accordance with the relevant legislative framework;
- to introduce authority personnel to new technologies to monitor a pollution incident for immediate response;
- to strengthen the capacities of environmental authorities, emergency response units, and other key stakeholders in responding to marine pollution incidents arising from or occurring during armed conflicts;
- to support the training of civil engineers on the subject Response to disasters and accidents in the Black Sea at the Technical University – Varna;
- to support training of volunteers for participation in joint (naval/marine) exercise with focus on marine pollution preparedness and response;
- to train environmental and emergency response personnel in the rapid assessment, rescue, and rehabilitation of oiled or contaminated marine wildlife.

• Geographical Coverage: Specify regions/countries/coastal zones covered.

The training course is intended for application on national level in Bulgaria. The region covered is the Black Sea coastal area with the related regional and municipal administrative units, and the national sea area with the maritime spaces defined in the Bulgarian legislation and the related Bulgarian maritime search and rescue response area, also defined in the legislation. These areas are associated with the national responsibilities for protection of the marine environment and the specific responsibilities of institutions in case of maritime emergencies, preparedness, and response to marine pollution incidents.

The course is general in character with relevance to the whole coastal and sea area. It is designed to reflect the Bulgarian legislative framework, response structures, institutional responsibilities, and key challenges. That includes alignment with national contingency plans, coordination mechanisms in case of emergencies, and integration of case-studies of past incidents with analyses, conclusions, and recommendations. The Black Sea regional legal framework with reference to national obligations is also included.

- **Pollution Types:**

- **Monitoring preparedness**

The training plan envisages pollution types identified in the monitoring and assessment framework on marine pollution within the RESPONSE project (M2). The evaluation of the monitoring and assessment framework on marine pollution in Bulgaria that is used in the project is mainly based on the Updated Assessment of the State of the Marine Environment (2021), which is part of the Marine Strategy of Bulgaria. The existing Bulgarian monitoring and assessment framework comprehensively covers parameters such as eutrophication, chemical contaminants and invasive species. There is a growing database on marine litter, which should make it possible to assess the state of its impact in the near future. There are separate observations on underwater noise, but no consistent monitoring, while atmospheric deposition in the marine environment is not currently part of the monitoring effort.

The training plan also addresses pollution types identified through the project research activities within D 1.3 Assessment report of types and impacts of marine pollution. They provide additional information on types of pollution: pollution with heavy metals, radioactive contamination, nutrients, pesticides, marine litter, oil pollution, pollution due to war conflicts. Specific feature of the report is pollution associated with armed conflicts. Monitoring of pollution with new technologies is of particular interest for training purposes.

The pollution types addressed in the training plan focus primarily on: pollution with contaminants (heavy metals), oil, eutrophication (nutrients), marine litter, pollution from armed conflicts (including a complex of pollution types). Parts of the training will touch on to the other pollution types identified above depending on the topic. The training plan will involve:

- **Emergency response**

The plan envisages training on pollution types associated with emergencies and the resulting marine pollution: oil pollution/spills, chemical pollution/spills (e. g. spills from bulk cargo of mineral nitrogen fertilizers), pollution due to war conflicts.

The information for the training comes from national emergency response plans, reports on past incidents, research on war pollution incidents.

Identify the stakeholder groups to be involved

- **Identify relevant stakeholders.**

The *key stakeholders* for Bulgaria have been identified at the start of the project (in D1.1) on the basis of review of the national legal framework, combined with survey and interviews, and include a short, though not exhaustive, list of stakeholders on national level: Executive Agency

Maritime Administration, Ministry of Interior, General Directorate 'Fire Safety and Civil Protection', Black Sea Basin Directorate, District Varna, District Burgas, Institute of Oceanology – BAS, Technical University of Varna, Dept Ecology and Environmental Protection. These organisations are characterised by a combination of attributes. Some have a coordinating role defined in a legal act, others have unique expertise in the marine environment. Smaller consultancies and NGOs can also be included because of their networking role, accumulated knowledge and skills in training at national and international level.

The results of the stakeholder analysis revealed a need for better coordination mechanisms and intersectoral dialogue. The process of analysis of stakeholders in terms of influence, capacity, and role in preparedness/response continued.

- **Conduct a stakeholder analysis:** influence, capacity, and role in preparedness/response.

Prioritizing key stakeholders in Bulgaria has been performed in the process of preparation for the co-creation workshop and reflect their influence, capacity and role in preparedness/response

- decision-makers in marine pollution response,
- relevant administrations and agencies,
- research institutes, universities,
- training centers,
- marine business associations,
- NGOs, and
- volunteer groups.

Their roles on national level have been clearly outlined with background information and analysis on the current state of training programmes in preparedness/response in Bulgaria conducted for D 2.1.

Analyses have shown that very few institutions have in-house training programmes, e. g. the Bulgarian Ports Infrastructure Company. Only a limited number of multi-institutional programmes support coordinated action in the event of marine pollution accidents. The annual Marine Breeze Exercise is the only notable example, involving the navy, the maritime administration, the border police, the Black Sea Basin Directorate and other institutions, and often featuring foreign participation. Traditional training for seagoing jobs meets international IMO and EU standards, but is related to routine work on board commercial vessels (e. g. applying the Marpol 73/78 convention). Training programmes for seafarers are not directly related to the monitoring of the Black Sea environment or the emergency response obligations of national institutions.

Some employees in the maritime and port administration and government structures have received training as seafaring professionals. However, this does not apply to all employees, nor does it involve regular updates to their training. International cross-border projects provide (multi)-institutional training support that is usually topic-specific, e.g. vessel traffic monitoring systems.

The publicly available training plans and curricula on preparedness and emergency response to nature and man-incited technogenic disasters (with some relation to marine pollution) are those of technical universities, the naval academy, training centres for seamen, universities, and training centres of the interior ministry. They are mostly oriented to disaster response plans and institutions, as designated in the National Disaster Response Plan. Monitoring and emergency response to marine pollution of the marine environment is covered rather briefly in some programmes and is not included in others. Therefore, existing training programmes need to be updated and developed further.

In Bulgaria, there are contingency plans for dealing with oil pollution at sea. The National Black Sea Oil Spill Emergency Plan for Bulgaria, part of the National Disaster Protection Plan, was adopted on 01.12.2011. Some of its provisions are reflected in the disaster protections plans for the coastal area. However, other pollutants remain outside the scope of current plans and training programmes, resulting in lost time and delays in decision-making when institutions face new challenges. There is also a recently adopted National Plan for Search and Rescue in the Bulgarian Maritime Search and Rescue Response Area, effective as of 14.08.2024. It focuses on search and rescue of human life and property/vessels and pollution prevention remains in the province of other institutions.

Most institutions are not involved in the development of training materials especially on marine pollution and emergency response and pollution remediation, except for oil pollution. Many institutions however apply collaborative efforts with other official institutions, such as ministries, state agencies, involved in activities addressing marine pollution from the military conflict in the Black Sea. Few key experts have specific expertise on specific marine pollution topics and the Marine Strategy Framework Directive (MSFD) descriptors, related to the National Marine Strategy of Bulgaria, mostly marine researchers from the Institute of Oceanology – BAS.

The project team has not identified any Life Long Learning programmes focused specifically on preparedness and emergency response to marine pollution for employees of the key stakeholders (transport administrations, local and regional authorities). The project team has not identified extracurricular programmes on RESPONSE issues to support gaining job experience and qualification for employees of the same key stakeholders.

Given the above, and considering that a key objective of the project's new-generation training programs and curricula is to engage competent key stakeholders with further initiatives, the team identified two target groups of stakeholders that can be involved in the training process.

- **Involve stakeholders in co-designing the training agenda**

The following two groups have been identified in the process of preparation for the co-creation workshop. They are target groups for the co-design of the training agenda

1) decision makers, representatives of administrations and institutions, especially people participating in civil defence units and teams, emergency response teams, businesses involved in training activities, local communities, volunteers, NGOs, media etc. – interested in short 1-to-1.5-day courses, problem-oriented training, use of the project online platform and tools;

2) representatives of education institutions and academia, university students, distance learning students, other maritime professionals - interested in extracurricular programmes and

studies, use of combinations of modules, use of the online platform and tools of the project.

Needs assessment

As part of the training design process, and once the target stakeholder groups for the training courses have been identified, the following existing training gaps and monitoring challenges have been listed in view of the curriculum topics:

Training gaps and monitoring challenges:

- Oil spills are the focus of most in-house training.
- Few comprehensive programs address pollution in a broader sense (chemical spills, garbage, hazardous substances).
- Maritime academies are in compliance with IMO/MARPOL standards for seafarers, but do not thoroughly cover multi-agency response or advanced surveillance.
- Data collection is fragmented and carried out by different agencies (e.g. Black Sea Basin Directorate, Institute of Oceanology, Health Inspectorates).
- There is a need to integrate the indicators of the Marine Strategy Framework Directive (MSFD) and to ensure synergy with the National Oil Pollution Emergency Plan for the Black Sea.

Stakeholder Recommendations addressing specific training needs

Need for modular, practical, and adaptable training to include topics:

- Pollution sources and impacts – oil spills, hazardous substances, eutrophication, marine litter
- Preparedness and response strategies – National contingency plans, risk assessment, decision-making
- Technological innovations – digital monitoring tools, remote sensing, modelling and AI applications/EWS
- Policy and governance – MARPOL, Bucharest Convention, EU Directives
- Practical training and exercises – fieldwork, case studies, real-time response simulations
- Public communication improvement (media handling, volunteer engagement, local community outreach).
- Multi-stakeholder coordination (navy, port authorities, communities).

Key issues highlighted by participants in the workshop/review:

- The value of modular curriculum including advanced monitoring and response simulations,
- A potential synergy with Varna Technical University to integrate modules into engineering and risk management programs
- The need for practical exercises (field exercises, multi-institutional simulations).

Define training content, materials and further requirements

- **Co-designed curricula alignment**

Objective: Ensure, through active consultation and exchange of opinions, that training requirements in Bulgaria are directly aligned with curricula collaboratively developed by the relevant stakeholders involved in the process, including maritime institutions, academic partners, agencies, businesses, experts etc.

Actions: Map the contents of the training modules to support the competencies defined in the co-creation process in Bulgaria correlated with regional co-creation; integrate feedback from end-users and industry to ensure real-world relevance; maintain a dynamic alignment process to adapt to evolving operational challenges in Marine Pollution (MP) management; ensure compliance with national and international standards for maritime training and pollution control.

- **Exercises/experiments development** – Syllabus Specifications for selected MP Modules of the training curricula

Objective: Design practical training, exercises and experimental activities that align with the specific syllabus requirements of selected Marine Pollution (MP) training modules for Bulgaria.

Actions: Curriculum specifications for selected modules of the training programme for Bulgaria

The team has developed practical training material, exercises and experimental activities that meet the specific curriculum requirements of selected marine pollution (MP) training modules. The selected modules are aligned with the prioritization performed at the regional co-creation workshop. The curriculum areas are aligned with the identified stakeholder needs. They also envisage the integration of scientific and digital tools, a focus of interest in all project countries. The training puts an emphasis on best practices, success stories, and innovative approaches fostering collaboration to be integrated in the training. The modules for Bulgaria follow the pattern and numbers approved at the regional co-creation workshop. They are identified by titles referring to the contents and numbers, basic information, target audience, number of hours work depending on the audience, contents outline, and in the finalized version references, and essential reading list.

The learning outcomes are identified for each module. Performance is measured with tests and scoring system of performance for the module. The exercise try to integrate real-time data and MP decision-support tools (DSS) to simulate realistic MP intervention conditions. The design of the exercises supports both individual skill development and team-based operational coordination. The training provides an opportunity to align experimental content with the latest scientific standards, environmental policies, and regulatory requirements. The co-designed curricula correlated with training modules for Bulgaria is part of Annex 1.

- **Toolkit/IT Platform Requirements**

Objective: Define the functional and technical requirements for the IT platforms and toolkits that will support the delivery and application of MP training programs.

To effectively deliver and apply marine pollution training programs using IT platforms and toolkits, several functional and technical requirements must be considered: platform capabilities, content delivery features, user management, assessment tools, and support

systems. Those functional and technical requirements should be adapted to the requirements of the RESPONSE framework.

Actions: Specify user needs, accessibility standards, and interoperability requirements for the training toolkit; Identify the digital tools, software, and platforms necessary for real-time simulation, env. impact data analysis/NEBA, and interactive training; ensure the platform supports modularity for scalable and customizable training delivery (e.g., by role, region, or threat level); integrate visualization tools for marine environmental data, early warning systems, and pollution modeling; prioritize user experience, multilingual support, and security compliance in platform design.

The training toolkit should be designed with the needs of diverse learners in mind, prioritizing open accessibility to internet, and ensuring interoperability with various systems. Key considerations include making the toolkit perceivable, operable, understandable, and robust, while also allowing for integration with other learning platforms and technologies.

Real-time simulation requires specialized digital tools, software, and platforms designed for high-speed computation and interaction with physical systems. Key components include simulation software like RT-LAB or Mevea Simulation Software, which can handle complex physics-based models and connect to real-world hardware. Hardware-in-the-loop (HIL) systems and rapid control prototyping (RCP) tools are also essential for testing and validating control systems in real-time.

To support scalable and customizable training delivery, the platform should be built with modularity in mind. This allows for the creation of training programs that can be easily adapted and delivered to different user groups (e.g., by role, region, or threat level). This modularity can be achieved through several strategies.

To integrate visualization tools for marine environmental data, early warning systems, and pollution modeling the following actions can be envisaged: creation of a centralized database to store information from different sources (satellite images, sensors, laboratory analysis); standardise data collection formats and methods to ensure compatibility between different systems; using GIS (Geographic Information Systems) to create interactive maps showing the current state of the marine environment; implement data analysis algorithms that can predict potential environmental risks and threats; create automated alerts and notifications for operators and stakeholders when anomalies or critical values are detected; conduct training for staff who will use the systems to ensure their proper use and interpretation of results; provide technical support and software updates; development of mathematical models to simulate the distribution of pollutants in water bodies; validation of models by comparison with real data and adjustments where necessary; developing graphical interfaces to present data in real time, such as charts, tables and animations.

To prioritize user experience, multilingual support, and security compliance in platform design actions can include: conduct user tests and surveys to assess satisfaction and identify areas for improvement; design an intuitive and easy-to-use interface that minimizes complexity and maximizes efficiency; if applicable translation of the interfaces and documentation of the platform into the main languages used by the target users; introduce mechanisms to collect user feedback and use it to improve the functionality and security of the platform.

Structure the training programme

• Training Deployment Specifications

Objective: Establish clear specifications for the rollout and operationalization of MP training across local, national and regional contexts (institutional and legislative).

Actions: Define deployment modes (e.g., in-person, hybrid, e-learning, define whether there will be simultaneous drills, field demonstrations and site visits) tailored to different stakeholder groups and operational settings; Set timelines - duration, logistical requirements, and resource allocation for effective training delivery; Develop guidelines for trainer certification, participant selection, and evaluation procedures; Ensure integration with institutional/stakeholders training calendars, emergency response trainings, and continuous preparedness/learning pathways. Establish mechanisms for feedback collection, course iteration, and long-term sustainability.

Deployment modes in Bulgaria are designed to the specific needs of the stakeholder groups identified within the RESPONSE framework. Each module will be customized for different stakeholder groups, indicatively decision-makers and emergency responders; academia and technical universities students; general public and volunteers.

The groups of decision makers, emergency response personnel, volunteers and NGOs can be involved in in-person, hybrid, e-learning forms of training. The time span is 1 to 1.5 days, resource allocation and logistics depend on the particular group training sessions. Initial version of guidelines for trainer selection/certification of trainers and the evaluation procedures will be approved by the joint partnership. Suggestion for training calendar for Bulgaria will be developed and approved at the national training workshop to ensure integration into institutional training and planning activities.

The group of students will most likely be involved in a course with duration one semester including lectures, seminars and exercises. This stakeholder group of academia and universities is interested in regular and extracurricular programmes and studies, use of combinations of the project modules, use of the online platform and tools of RESPONSE.

The Technical University – Varna has adopted decision to integrate parts of the project modules into risk management program for risk engineers of a new subject entitled "Response to disasters and accidents in the Black Sea". The course envisages 30 lectures (60 lessons) and 30 exercises(60 lessons), total number of lessons 120, credits 4. A variety of forms of training will be used lectures (in-person), seminars, practical exercises. Development of practical exercises and experimental activities that meet the specific curriculum requirements of selected marine pollution training modules is envisaged.

The team will design and establish with support from national and cross-border RESPONSE stakeholders mechanisms for feedback collection, course iteration, and long-term sustainability.

Develop training materials

The development of training materials will incorporate a diverse and comprehensive set of resources designed to support effective learning and practical application. These will include manuals, handbooks, and standard operating procedures (SOPs) to provide structured

guidance, as well as case studies of past marine pollution events to offer real-world context and lessons learned. Multimedia elements such as videos and interactive simulations will enhance engagement and experiential understanding. Where necessary, materials will be translated into local languages to ensure accessibility and inclusivity. In the framework of RESPONSE project, all training content will feature a digital component and be integrated with the RESPONSE Digital Toolkit, facilitating flexible, scalable, and user-friendly delivery across stakeholder groups. Specifically:

- **Development of Training modules** (Create structured syllabus, outcome-based training modules tailored to the core domains of Marine Pollution preparedness and response)

Actions: Design modular content for opening, intermediate, and advanced levels of MP training/knowledge and practice; Align module content with international maritime training standards and co-designed curriculum frameworks; Incorporate multimedia resources, case studies, and scenario planning to enhance engagement and realism; Provide role-specific pathways (e.g., seafarers, port authorities, environmental analysts) within the curriculum.

The BSNN with support from Bulgarian stakeholders and volunteers is involved in the development of the Training Modules. The ideas of the national co-creation workshop collated with the regional co-creation suggestions are reflected in Annex 1. They respect all the above requirements describing the actions. Each module will be customized for different stakeholder groups.

- **MP Exercises, Simulations & Assessment Framework** (Develop robust practical and theoretical frameworks, along with versatile and replicable exercises, to simulate Marine Pollution (MP) incidents and validate trainee competencies across operational contexts)

Actions: Develop versatile and replicable exercise templates adaptable to different marine contexts and pollution scenarios; Incorporate key variables such as spill magnitude, weather conditions, environmental sensitivities, and inter-agency coordination into simulations; Align exercises with international response protocols, national contingency frameworks, and environmental regulations; Frame each simulation with pre- and post-exercise briefings to provide contextual understanding and enhance learning outcomes; Design performance-based assessment frameworks linked to module-specific learning objectives and real-world competencies; Integrate simulation-based evaluations, decision-making tasks, and scenario response assessments to test operational readiness; Ensure standardization and fairness in evaluation criteria while maintaining flexibility for contextual adaptation; Embed feedback mechanisms and structured post-assessment reviews to support continuous learning and improvement.

The above actions will be undertaken by BSNN team and stakeholders in the preparation of MP exercises, simulations and assessment and validation of trainee competences.

- **Teaching Methodology - for preparedness and for rapid response** (Adopt adaptive and evidence-based instructional methods tailored to both prevention and emergency response contexts by aligning the instructional approach with the distinct demands of preventive training—such as risk forecasting, policy planning, and preparedness strategies—and emergency intervention, including rapid decision-making, operational coordination, and real-time response.)

Actions: Use differentiated instructions for preparedness (e.g., policy planning, risk forecasting, NEBA) vs. rapid response (e.g., field deployment, coordination); Blend classroom instruction with experiential learning and digital simulations; Promote collaborative training and peer-to-peer knowledge exchange; Integrate real-life marine pollution (MP) events and lessons learned into the training strategy; Use risk assessment, policy simulation, and scenario planning to enhance preparedness training; Focus on decision-making under pressure, communication chains, and field coordination in emergency response training; Develop dual-track methodologies that bridge strategic planning with tactical execution; Ensure both tracks foster interdisciplinary coordination and real-time adaptability.

The above teaching methodology for preparedness and rapid response is applied in the design of preparedness and rapid response classroom instructions, experiential learning, digital simulations by the BSNN and stakeholders in the training process. The concept of Net Environmental Benefit Analysis (NEBA) and Spill Impact Mitigation Assessment (SIMA) will be introduced to the stakeholders.

• **Teaching platforms - available Services/Software/toolkits for marine environment/EO & Model data** (Leverage available marine environment tools, Earth Observation (EO) systems, and environmental models to support MP training)

Actions: Integrate satellite-based EO services, CMEMS products, and marine forecasting tools into teaching platforms; Provide access to real-time and historical datasets for pollution tracking and response modeling; Train stakeholders on interpreting model outputs and integrating them into operational decisions. Ensure compatibility with existing national and regional digital infrastructure.

The BSNN with support from Bulgarian stakeholders and partners will be involved in the training on interpreting model outputs and integrating them into operational decisions. The partner will suggest to involve Bulgarian stakeholders in assessing the compatibility

• **CMEMS-DSS/toolkit demonstrators Setup** (Showcase real-world MP applications via demonstrators; Deploy functional demonstrators integrating Copernicus Marine Environment Monitoring Service (CMEMS) tools, downstream national/regional services and EWS/Early Warning Systems and Decision Support Systems (DSS), as well, for MP advanced research training).

Actions: Set up demonstration environments to showcase real-world applications of EO and EWS/DSS tools in MP scenarios; Provide guided walkthroughs, hands-on sessions, and test cases for training participants; Integrate demonstrators with existing institutional/legislative frameworks and regional systems; Facilitate early user feedback to improve system relevance and usability.

The BSNN with support from Bulgarian stakeholders and volunteers will be involved in the testing of the envisaged actions above.

• **Toolkit Platform Development** (Build a dynamic, user-orientated digital platform to host, manage, and disseminate the (re)configurable training toolkit)

Actions: The BSNN with support from Bulgarian stakeholders will be involved in the discussion of the design and the testing of the a web-based portal with modular access by role, function,

and institutional level. Key stakeholders will be invited to test using the portal and provide feedback. The partner team will invite volunteers with engineering background to test using the interactive dashboards, GIS integration, and customizable trainings pathways, the functioning of the cloud-based access, and the BS area multilingual interfaces, and collaborative spaces; Include analytics for tracking participation, performance, and impact metrics.

Trainers and facilitation

Recruiting the right trainers is a key element in ensuring the success of the training program. It involves selecting qualified experts with specialized knowledge in marine ecology, spill response, and emergency management to deliver effective and credible instruction. Involving international or regional organizations such as EMSA and IMO further enhances the program's relevance and quality. Additionally, providing "training of trainers" (ToT) sessions helps build a sustainable pool of skilled facilitators who can continue delivering the training beyond the initial phase.

The selection of qualified experts for training in Bulgaria will be planned and implemented in view of the available resources of BSNN. The organisation can rely on its networking contacts in the marine ecology institutes and agencies and the maritime administrations and companies. Contacts in the academia and technical sphere and involvement of qualified lecturers and experts will also help in ensuring the success of the training program. Experts with practical experience in preparedness and response to maritime accidents and maritime will be invited to deliver instruction.

Evaluation and Monitoring

Evaluation and monitoring are essential components of the training process, aimed at measuring the effectiveness, efficiency, and overall impact of the MP training system against predefined benchmarks. This step involves conducting pre- and post-training assessments to quantify knowledge gained by participants, as well as gathering participant feedback through surveys and forms to capture their experiences and suggestions. Performance is also observed and evaluated during practical drills to assess real-time application of skills. Key Performance Indicators such as the percentage of participants demonstrating improved knowledge or the speed of response during simulations are established to provide clear metrics for success. Benchmarking criteria are developed based on international best practices and aligned with national and regional performance indicators. The collected data is thoroughly analyzed to identify strengths, gaps, and opportunities for improvement, with findings used to continuously refine the training curricula, instructional methods, and digital toolkits, ensuring that future training cycles are increasingly effective and responsive to stakeholder needs.

The **RESPONSE team** in cooperation with project partners has designed a set of criteria for measuring the training achievements, performance effectiveness and impact. They are integrated in the project monitoring and evaluation framework.

RESPONSE Specific objective 8 (T3.1 Objective): Develop comprehensive operational planning to solidify the application and effectiveness of marine pollution training (baseline target AI.8. – Increased number of operation plans per BS country) - Indicators: I. Tailored training operational plans (3-4)

Result: Developed comprehensive operational plans for effective marine pollution training

Result indicator: Tailored training operational plans (3-4); baseline target AI.8. – Increased number of operation plans per BS country.

Impact indicators: (change in target groups, capacities, innovation, plans content etc.):

- Learner satisfaction – assessing the overall quality of training experience of participants. Involves rating the learner's approval of selected topics, delivery of the training material, clarity, usefulness of training in on-the-job application on a scale from 1 to 5. Baseline value 3 indicated by 50% of the respondents, target value – 4 indicated by 50% of the respondents. High satisfaction scores indicate that the training content is relevant, engaging and effectively delivered.

- Knowledge retention – measuring the extent to which the trainees have mastered the transmitted knowledge. The assessment is done by means of tests to the respective topics. The baseline indicator is 50% success in reporting the test results, target value – 70% success.

- Long-term knowledge retention – measuring the training lasting impact. The assessment of long-term retention is essential for the training lasting impact. It can be measured through opinion survey with administrations of institutions involved in the training, interviews with key stakeholders and experts. Baseline – positive attitude to training. Target – marked expression of support, demand for new courses.

- Practical relevance and application – evaluate how well participants can apply the knowledge and skills gained from the training in their day-to-day work. This metric directly reflects the practicality of the training content retention to ensure that the training has a lasting impact. Measured through interviews with stakeholders.

Responsible for information collection: country coordinator and team

Reporting: in writing, one month after the completion of T3.1.

Follow up and sustainability

Follow-up and sustainability are critical to ensuring the long-term impact of the marine pollution training program. Upon completion, participants should receive certificates recognizing their newly acquired skills and knowledge. Efforts should be made to encourage the integration of the training content into contingency plans, reinforcing its practical application within existing frameworks. To foster ongoing collaboration and knowledge exchange, a network or forum for trained professionals should be established, providing a platform for continuous communication and support. Annual refresher courses or updates should be planned to maintain and enhance competencies over time. Additionally, training outcomes and lessons learned should be regularly documented and shared through reports and policy briefs to inform stakeholders and support policy development.

The BSNN will ensure follow-up activities on national level and will continue with the established tradition to present certificates recognizing the participants' newly acquired skills and knowledge. Efforts will continue to encourage integration of the RESPONSE training content in contingency plans, practical exercises, inclusion in networking events. Project achievements

and training outcomes and lessons learned will be documented and shared through networks, events, stakeholder meetings.

Integration into broader systems

To ensure the marine pollution training program has a lasting and wide-reaching impact, it is essential to integrate it into broader systems and frameworks. This involves aligning the training content and objectives with existing national emergency response and maritime policies, ensuring consistency and support from relevant authorities. Additionally, establishing strong links with European Union mechanisms and regional Black Sea frameworks will promote coordination and harmonization across borders, enhancing regional preparedness and response capabilities. The training outcomes and best practices should also be incorporated into the capacity-building components of related projects, creating synergies and reinforcing the overall effectiveness of marine pollution management efforts.

BSNN will support aligning the training content and objectives with existing national emergency response and maritime policies in Bulgaria, in view of the European Union mechanisms and regional Black Sea frameworks promoting coordination and harmonization across borders, enhancing regional preparedness and response capabilities. BSNN will seek to integrate RESPONSE training outcomes and best practices into capacity-building components of related projects, creating synergies and reinforcing the effectiveness of marine pollution management efforts.

1.2 National Training Course in Georgia

Purpose, scope, stakeholders and their needs

Institutional Context and Needs: Georgia's framework for marine pollution response involves several key institutions, notably the Ministry of Environmental Protection and Agriculture (MEPA) (responsible for environmental policy and monitoring via the National Environment Agency) and the Ministry of Economy and Sustainable Development (through its Maritime Transport Agency, overseeing maritime safety and spill response). Local bodies (e.g. Adjara Autonomous Republic's environmental department) and NGOs, such as Greens Movement of Georgia / Friends of the Earth – Georgia (GMG/FoE-GE) also play roles. A **Stakeholder Analysis (D1.1)** revealed that while these agencies have clear mandates, coordination and training are areas for improvement. There are few dedicated inter-agency training programs; most existing training focuses on **oil spill response** within individual organizations, with **limited multi-institutional exercises**. Georgia does maintain an **oil pollution contingency plan** under the Maritime Transport Agency (aligned with the Black Sea regional contingency framework), but **preparedness for other pollution types** (plastic debris, chemical spills, etc.) is *ad hoc*. This gap was echoed in the **Needs Assessment (D1.2)**, which highlighted the need for **better coordination, updated knowledge (e.g. modern tools)**, and sustained funding for training. In short, Georgia's institutions require a more comprehensive and harmonized training scheme to improve national response capacity.

Training content, structure of the training programme

Co-creation and Stakeholder Input: In February 2025, the project's Georgian partner (GMG/FoE-GE) convened a national co-creation workshop in Batumi to design Georgia's advanced training course. This workshop **brought together key stakeholders** – including government agencies concerned with marine pollution (MEPA, the Maritime Transport Agency, Coast Guard representatives), academia (Batumi Shota Rustaveli State University and Batumi State Maritime Academy), and civil society – to jointly identify training needs and shape the curriculum. Notably, a senior official from the maritime authority delivered a comprehensive review of Georgia's **oil spill response capacity**, underscoring institutional commitment to improving readiness. (The heightened interest was in part spurred by a recent Black Sea oil spill incident near Kerch, which underscored the urgency for better preparedness.) Stakeholders at the Batumi workshop affirmed that while Georgia has solid foundations (e. g. an operational national spill-response plan), it must **expand training to cover diverse pollution scenarios** and strengthen inter-agency collaboration. This participatory input has been pivotal in tailoring the national course to Georgian realities. The workshop's conclusions (Milestone 6 and D2.1) stressed that an advanced curriculum should **complement existing national training** (notably in disaster management and maritime education) and address the gaps in coverage, ensuring all relevant organizations are engaged.

Curriculum Structure and Content: Based on the co-creation outcomes and the project's framework for training (Milestone 6), Georgia's national training course is structured as a **modular program** covering the full spectrum of marine pollution preparedness and response. It builds directly on the curriculum model developed in WP2 and aligns with the common Black Sea training framework, while reflecting Georgia's specific needs. The curriculum comprises **multiple modules**, each focused on a thematic area, as summarized below:

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- **Module 1: Marine Pollution in Context – Causes and Effects** would provide an overview of marine pollution types and their impacts in the Black Sea context. Topics would include oil spills (e.g. from shipping or offshore activities), marine litter and microplastics, eutrophication (nutrient pollution), hazardous substances, sewage and ballast water discharges, and even pollution stemming from armed conflicts. This module would set the stage by examining sources and consequences of pollution along Georgia's coast and the wider Black Sea, thereby underscoring the importance of preparedness.
 - **Module 2: Legislation and Governance** would review the international and regional legal frameworks alongside national policies governing marine pollution. It would cover key conventions – e.g. MARPOL, the London Convention, OPRC 1990 and its HNS Protocol – and Black Sea regional agreements, as well as Georgian laws and contingency plans for marine environmental protection. Institutional roles and coordination mechanisms in Georgia (across ministries, agencies, and local authorities) would be discussed to clarify **who does what** in both prevention and emergency response.
 - **Module 3: Monitoring Techniques and Tools** would focus on marine environmental monitoring and early warning. Trainees would learn about designing sea monitoring programs and surveys, water and sediment sampling methods, laboratory analyses, and the use of technologies like remote sensing, drones, GIS mapping and oceanographic modelling. The module would draw on existing experiences (such as those of the National Environment Agency, other research institutions), and introduce the project's digital toolkits (e. g. use of Copernicus marine data, the Black Sea SOS platform from H2020 projects, etc.) to enhance data-driven pollution assessment. Building capacity in regular monitoring is crucial for Georgia's contribution to regional environmental status reports.
 - **Module 4: Emergency Response Practices** would be a core module on operational response to marine pollution incidents. It would cover oil spill response strategies (tiered response, containment and recovery techniques, use of skimmers, booms, dispersants – noting Georgia's national stockpiles and equipment), as well as response to **non-oil pollution events** such as chemical spills (hazardous & noxious substances) or large-scale marine litter pollution incidents. Trainees would be introduced to the Incident Command System and coordination of response at sea and shore. Health and safety procedures for responders would be emphasized. The module would include simulation exercises and case studies (e. g. past spill events in the Black Sea) to build practical skills. *(Notably, major oil spill exercises have been conducted by Georgia in the past, e. g. the “GEO OSREX” drills, and the lessons from these would feed into the training scenarios.)*
 - **Module 5: Restoration and Mitigation** would cover post-incident environmental remediation and longer-term pollution mitigation measures. Topics would include shoreline clean-up techniques, rehabilitation of affected wildlife and habitats, bioremediation and nature-based solutions, and monitoring of recovery. The module would also look at mitigation of chronic pollution: for example, measures to restore water quality (e.g. protection/restoration of coastal wetlands), and strategies to reduce ongoing inputs of pollutants. The content would ensure that trainees grasp the full cycle of response and recovery, aligning with ecosystem-based management principles and nature-based solutions.

Across Modules 1–5, the curriculum would **integrate cross-cutting issues** such as climate change impacts (e. g. how warming and sea level rise may exacerbate pollution effects), marine biodiversity protection, and emerging concerns like **underwater noise pollution** and ocean acidification, which are often overlooked in traditional training. By weaving these into multiple modules rather than isolating them, the course would keep a holistic perspective. The use of interactive teaching methods would be stressed throughout – including scenario-based learning, group problem-solving, and use of the project's online tools – in line with best practices outlined in RESPONSE project Milestone 6.

Advanced Modules (Prevention, Preparedness, Response): In addition to the basic modules above, the Georgian course would include specialized modules that go deeper into **pollution prevention, preparedness planning, and response management**, adapted from the common Black Sea curriculum framework (as demonstrated by the Bulgarian training scheme). These would ensure that Georgia's training aligns with regional standards and covers advanced competencies:

- **Module 6: Pollution Management and Sustainable Practices.** This module would address proactive pollution prevention and mitigation strategies. It would examine pollution control measures relevant for Georgia, such as waste-water treatment improvements and port waste reception facilities to prevent marine dumping. It would introduce **pollution prevention policies** (e. g. implementing MARPOL standards on ships and in ports, reducing land-based sources of litter) and technological solutions like oil-water separators and innovative recycling approaches. Other topics would include **reducing plastic waste** through policy (e. g. plastics management, circular economy initiatives) & promoting **sustainable shipping practices** (green port concepts, vessel reporting of pollution, etc.). By highlighting preventive measures, this module would reinforce that effective response starts *before* an incident occurs.
- **Module 7: Marine Pollution Preparedness** would focus on how to develop, evaluate, and update effective contingency plans and readiness measures. Trainees would be introduced to Georgia's **National Marine Pollution Contingency Plan** (with an emphasis on the National Oil Spill Response Plan) and its integration with the Black Sea regional plan. The module would review existing national emergency response system in Georgia – e. g. how a pollution alert is handled, from marine monitoring and distress calls to the mobilization and coordination of operational teams. International cooperation protocols would also be covered (the role of the Black Sea Commission's Emergency Response Centre, adherence to the OPRC convention and Emergency Protocols). Trainees would discuss key elements of effective contingency planning: defining roles and responsibilities of agencies and key personnel, identifying resource requirements (equipment, vessels, manpower), and ensuring communication flows. Practical aspects of **preparedness** would also be included, such as designing and conducting regular training drills and field exercises for Georgian responders, and mechanisms for assessing preparedness levels (using performance indicators, audits, etc.). This module would effectively translate policy into practice, preparing stakeholders to activate plans swiftly when needed.
- **Module 8: Preparedness Strategies and Risk Reduction.** This module would build on the previous one by looking at broader strategies to enhance preparedness and resilience. Topics would include conducting **risk assessments for vulnerable areas** of Georgia's coast

(e. g. identifying hot spots like ports, oil terminals, ecologically sensitive sites) and using those assessments to prioritize planning efforts. Trainees would learn about improving inter-agency coordination and communication (e.g. establishing a standing working group or task force on marine pollution response). The module would also cover **capacity-building strategies**: developing training-of-trainers programs, striving for securing funding and resources for sustained training and equipment modernization, and engaging in regional knowledge exchange (leveraging initiatives like EMSA workshops or regional projects). **Public awareness and community involvement** would be highlighted as well – e.g. how to run community education programs or volunteer networks for beach clean-ups and citizen reporting, thereby integrating local communities into the preparedness system. Finally, it would touch on the use of **early warning systems** (like environmental observation networks or pollution alert systems) and how Georgia can strengthen its early warning and monitoring to pre-empt or mitigate incidents.

- **Module 9: Marine Pollution Response Operations.** This critical module would deal with the effective management of response operations once an incident has occurred. It would provide an overview of response strategies for different pollution scenarios, drawing on international best practices and case studies (e.g. responding to an oil tanker spill vs. a hazardous chemical release). Trainees would explore **methods of intervention** and tactics to minimize impacts, including containment, recovery, dispersion, shoreline clean-up, and in-situ burning, as appropriate for each pollutant type. A significant part of the module is to be devoted to **incident management skills**: how to activate and lead an incident command structure, coordinate among multiple agencies (e.g. MTA, Coast Guard, NEA, local authorities) and possibly international assistance, and how to make real-time decisions under pressure. Building an efficient on-site operation would be discussed – from safety management for responders to logistics of deploying equipment and teams. The module would also revisit the national contingency plan in action: trainees would examine how Georgia's plan guides on-site actions for, say, a large oil spill, and identify any gaps or improvements needed (this would reinforce a feedback loop to Module 7 on plan improvement). Additional topics would include **monitoring and reporting during response** (using tools like modelling and GIS to track spills, drones for site surveillance, remote sensing etc.), and post-response debriefing and evaluation (assessing what went well and what needs improvement). Critically, this module would cover aspects such as **waste management** of recovered pollutants/debris and **environmental monitoring** during response to gauge effectiveness. It could also introduce modern concepts like using **virtual reality simulations** for responder training. Finally, the human dimensions would be addressed: guidance would be provided on **managing the media and public communication** during incidents (to ensure accurate information and maintain public trust), and on coordinating **volunteer or civilian response efforts** safely.

By covering these advanced modules (6–9) in addition to the basic ones (1–5), the **Georgian national training course** would achieve a comprehensive scope: from understanding pollution and prevention to being fully prepared for and capable of responding to marine pollution emergencies. The content would be based on **international standards and best practices** (e. g. adherence to IMO and EU guidelines) while being tailored to Georgia's institutional setup and Black Sea regional context.

Delivery of training, training materials, trainers and facilitation

Delivery and Implementation: The National Training Course in Georgia would be designed to be delivered through a combination of workshops, dedicated short courses, and integration into academic programs. A **dual-track approach** would be used to reach: **(1)** current professionals (government officials, port/Coast Guard officers, emergency responders, NGO staff) via short, focused trainings and drills; and **(2)** students and young professionals via university curricula or longer certificate courses. For the first group, modules could be offered as intensive training workshops (e. g. a 3-day course on spill response) or on-site seminars, which would suit busy practitioners. For the second group, elements of the curriculum may be incorporated into relevant degree programs (e. g. environmental science, maritime engineering) at Georgian universities, such as Batumi Shota Rustaveli State University (BSU), Tbilisi State University (TSU), Ilia State University (ISU), etc., ensuring sustainability of knowledge uptake. The Batumi State Maritime Academy (BSMA), as well as potentially the Environmental Information and Education Centre (EIEC) under MEPA, would be expected to be key hubs for delivering the training, in collaboration with project partners and international experts. Where possible and feasible, content would be delivered in Georgian language (with materials translated from the project's outputs) to maximize accessibility.

Crucially, the training course would employ **interactive and practical pedagogies**. Each module would include case studies drawn from Black Sea incidents and hands-on exercises or simulations (for example, a tabletop exercise in Module 4, or a field drill in Module 7) to reinforce theoretical knowledge. The approach will follow the Milestone 6 guidance on using **experiential learning and simulations** for marine pollution training. Additionally, the course would leverage the project's **digital platforms and toolkits**, offering trainees exposure to real datasets and decision-support tools (such as marine satellite data, forecasting models, and GIS applications). This not only would improve technical skills but also familiarize participants with the digital resources being developed under RESPONSE and other initiatives (e. g. the Black Sea SoS System of Systems developed by the EU H2020 DOORS project).

Evaluation and monitoring

The evaluation and monitoring of the training process, aimed at measuring the effectiveness, efficiency, and overall impact of the pollution preparedness and response training system will follow the framework envisaged for the RESPONSE project in D2.2. The project team in cooperation with project partners has designed a set of criteria for measuring the training achievements, performance effectiveness and impact. They are integrated in the project monitoring and evaluation framework. The national team will take part in conducting pre- and post-training assessments to quantify knowledge gained by participants, as well as gathering participant feedback through surveys and forms to capture their experiences and suggestions. Performance will also be observed and evaluated during practical exercises to assess real-time application of skills. The partner will provide feedback to the responsible partners so that the collected data should be analyzed to identify achievements and opportunities for improvement.

Follow up, sustainability, integration into broader systems

Stakeholder Engagement and Future Integration: The national training course is to be co-created *with* stakeholders, and moving forward, their engagement would continue in implementation.

Georgian authorities are expected to endorse the training program and possibly integrate it into the national system (e. g. as part of contingency plan procedures or civil servant training requirements). The workshop participants – representing agencies, academia, and NGOs – are expected to act as champions of the new curriculum within their organizations. This means, for instance, the Maritime Transport Agency and NEA and other relevant agencies (such as MIA coastguard) could incorporate modules into their routine staff trainings and drills. The ultimate aim would be to institutionalise the training: to make regular marine pollution training a standing practice in Georgia, continuously strengthening capacity.

The completion of the first training course under the Milestone 7 would be a demonstration exercise for the long-term effort. For the first course the theme of marine litter in various Black Sea compartments (beach, marine floating, seabed, flowing in rivers, macro-, micro- and even nano-litter, etc.) and methods for monitoring and collecting is selected.

The completion of the first training course under Milestone 7 would serve as a **demonstration exercise** for the long-term effort to institutionalize marine pollution training in Georgia. For this initial course, the selected **theme is marine litter**—addressing its presence in various compartments of the Black Sea: beaches, floating debris, seabed deposits, and riverborne inputs. The course would also cover different particle sizes, including **macro-, micro-, and nano-litter**, and would introduce **monitoring and collection methods** suitable for each type. This thematic focus responds directly to pressing pollution issues identified along Georgia's coastline and offers a practical entry point for implementing multidisciplinary monitoring and response techniques, as outlined in the RESPONSE framework. Cooperation with the BSB Interreg SAVE SEA and H2020 DOORS projects would be sourced to maximise quality & impact.

In summary, Georgia's National Training Course under the RESPONSE project would be a **comprehensive, tailored curriculum** that addresses identified gaps in marine pollution preparedness and response. It reflects both the **local context** (national plans, stakeholder structure, Black Sea specific issues) and the **state-of-the-art practices** in the field (modern tools, international standards, co-created content). By implementing this course, Georgia would significantly enhance its ability to prevent and manage marine pollution incidents, contributing to a safer and more resilient Black Sea environment. The training course would also contribute that those Georgian stakeholders remain actively involved in the regional knowledge network and ready to cooperate in cross-border pollution response, fulfilling one of the core goals of the RESPONSE project.

1.3 National Training Course in Romania

Introduction: legal framework, institutional obligations

As a member state of EU, in Romania the marine pollution (MP) issues are managed since 2008, by the EU adopted the Marine Strategy Framework Directive (MSFD). This Directive directly contributes to the ambition of the European Green Deal, namely Zero Pollution action plan.

All these encompassed actions must be done in close coordination with neighboring countries at regional sea level. Annex III of the Directive, detailing lists of characteristics, pressures and impacts that Member States need to consider in their marine strategies, was revised in 2017. To help MSFD implementation, Plan of Measures is in continuous implementation, setting out the completion of the qualitative descriptors which describe what the environment will look like when GES has been achieved. The descriptors with direct incidence to MP are, D2, D5, D8, D9, D10 and D11 (Descriptor 2: Non-indigenous species do not adversely alter ecosystems, Descriptor 5: Eutrophication is reduced, Descriptor 8: Concentrations of contaminants give no pollution effects, Descriptor 9: Contaminants in seafood are at safe levels, Descriptor 10: Marine litter does not cause harm, Descriptor 11: Introduction of energy (including underwater noise) does not adversely affect the ecosystem).

Some of the international and national key legislation and policies directly relevant to the MSFD are Others include the Single-Use plastics Directive, the EU Plastics Strategy, the Circular Economy Action Plan, Strategic Environmental Assessment and Environmental Impact Assessment Directives, the Port Reception Facilities Directive, the Ship-source pollution Directive, the Urban Waste Water Treatment Directive, the Waste Framework Directive and many others.

For the coverage area of Romanian EEZ of Black Sea, the Bucharest Convention on the Protection of the Black Sea Against Pollution adopted in 1992, in continuation of the United Nations Convention on the Law of the Sea (UNCLOS) is also essential, thus providing a legal framework for regional cooperation to protect the coastal and marine environment.

At national level, Romania has developed the National Plan for Oil Pollution Preparedness, Response and Cooperation in case of Marine Pollution in accordance with the Black Sea Contingency Plan. The Romanian Government adopted the national plan for preparedness, response and cooperation in the event of a hydrocarbon-related marine pollution incident along the entire Romanian coast by HG no. 893/2006, amending HG 1593/2002 on the approval of the National Plan for preparedness, response and cooperation in case of marine oil pollution.

The Regulation on the organization and functioning of the Marine Pollution Operational Command (CODM) was approved in April 2004.

The aim during the drafting phase of this plan was to organize pollution preparedness, cooperation and response at a national level. However, according to analyses carried out by the European Maritime Safety Agency (EMSA), Romania's preparedness and response capacity in the event of pollution is non-existent or very limited. According to the Regulation, the Water Directorate 'Dobrogea-Litoral', as the reporting body, is responsible for: identifying pollution and its elements according to the competences and organization of the intervention under the coordination of the Constanta Civil Protection Inspectorate (IPC); centralizing and keeping up to date the records of all depollution actions carried out in the coastal area from the activation of

the CODM until the end of the operations in the event of an incident involving major marine pollution; ensuring the participation of a representative in the CODM Technical Secretariat and ensuring the surveillance of the coastal area for oil discharges.

Purpose and scope of the RESPONSE training course

The following **key objectives** for training have been identified in view of the situation with preparedness and response to marine pollution incidents in Romania.

• Objectives of the training course:

- to increase the understanding of local, national and regional stakeholders on marine pollution emergency response and post-incident recovery and enhance their capacity to address the issues, through exercise of marine pollution response.
- to train the staff of administrations, institutions and agencies involved in marine pollution preparedness and emergency response on specific marine pollution issues in accordance with the relevant legislative national and regional framework.
- to introduce new technologies to monitor pollution incidents for immediate response;
- to strengthen the expertise capacities of environmental authorities, emergency response units, and other key stakeholders in responding to marine pollution incidents arising from or occurring during armed conflicts.
- to support and extend the existent training capacity with specific subjects on Response to disasters and accidents in the Black Sea, including the ones produced in conflict zones.
- to support training of responsible authorities in participation at planned joint (naval/marine) exercise with focus on marine pollution preparedness and response.
- to train environmental and emergency response personnel in the rapid assessment, rescue, and rehabilitation of oiled or contaminated marine wildlife (NEBA's approach assimilation).

• Geographical Coverage: Specify regions/countries/coastal zones covered.

The training course is intended for use at a national level in Romania. It covers the Black Sea coastal area and the related regional and municipal administrative units, as well as the national sea area and the maritime spaces defined in Romanian legislation. It also covers the Romanian maritime search and rescue response area, which is also defined in legislation. These areas are associated with national responsibilities for the protection of the marine environment, as well as the specific responsibilities of institutions in the event of maritime emergencies and incidents of marine pollution.

The course has a general focus and is relevant to the entire coastal and sea area. It reflects the Romanian legislative framework, response structures, institutional responsibilities and key challenges. This includes alignment with national contingency plans and coordination mechanisms for emergencies, as well as the integration of case studies of past incidents, including analyses, conclusions and recommendations. The Black Sea regional legal framework, in relation to national obligations, is also covered.

• Pollution Types:

- **Monitoring, preparedness**

The training plan envisages pollution types identified in the monitoring and assessment framework on marine pollution within the RESPONSE project (M2). All forms of pollution associated with the eleven environmental descriptor that express the state of the marine environment are subject to a national monitoring programme and specific environmental objectives. These objectives are included in a 'Programme of Measures' (PoM) which has been developed to achieve or maintain good environmental status (GES). This is based on Article 13 of the Marine Strategy Framework Directive (MSFD - 2008/56/EC).

The PoM includes 'existing measures', i.e. measures that are relevant for achieving or maintaining the GES of the marine environment and that have already been adopted under other European directives (e. g. the Water Framework Directive, the Birds Directive, the Habitats Directive and the Nitrates Directive) and international conventions to which Romania is a party, as well as regional policies that have been or have not yet been implemented. The PoM also includes 'new measures', which are measures that have been identified as necessary for achieving or maintaining the GES of the marine environment when existing measures are insufficient. These measures complement existing ones and can be completely new measures. They are periodically approved in national legislation and take into account the differentiated implementation of measures with transboundary impact (60% of the measures are joint with Bulgaria after extensive public consultations on both sides).

The training plan also addresses the types of pollution identified through the project's research activities in D1.3, the assessment report on the types and impacts of marine pollution. It provides additional information on the following types of pollution: heavy metal pollution, radioactive contamination, nutrient pollution, pesticide pollution, marine litter pollution, oil pollution and pollution due to armed conflict. A specific feature of the report is pollution associated with armed conflicts.

The training plan focuses primarily on the following types of pollution: oil pollution, Marine litter, pollution with contaminants (e.g. heavy metals), eutrophication (i.e. pollution caused by nutrients), pollution caused by armed conflicts (including a range of pollution types) Depending on the topic, parts of the training will also touch on the other pollution types.

- **Emergency response**

The plan involves training on the types of pollution associated with emergencies cases, such as oil and chemical spills (e.g. from bulk cargoes of mineral nitrogen fertilizers), and pollution resulting from the adjacent areas' war conflict. Training information comes to meet the need for support/better implementation of the national emergency response plan, reports on past incidents and research on war's marine pollution/incidents impact.

Identify the stakeholder groups to be involved

- **Identification of the relevant stakeholders**

The key identified stakeholders for Romania, reviewed from the beginning of the project (in D1.1), based on the national legal framework, combined with survey and interviews, can be included in a short list, starting with the Operational Commandment for Marine Pollution, Inspectorate for emergency situations Constanta, Operational Commandment for Marine Pollution, Prefect of the County Constanta, President of County Council of Constanta and Tulcea, Inspectorate for

emergency situations Constanta, Romanian Naval Authority, Romanian Waters Administration – Dobrogea-Littoral, Coast Guard, Constanta Maritime Ports Administration, Environmental national guard, Danube Delta Biosphere Reserve Administration, NIMRD and NIDD. Also, several consultancies' SMEs and NGOs can also be included in the training plan, due to their networking role, accumulated knowledge and skills in training

- **Conduct a stakeholder analysis:** influence, capacity, and role in preparedness/response.

The process of preparing for the co-creation workshops, involved in WP2, identifying and prioritizing key stakeholders in Romania, were based on their influence, capacity, and role in preparedness and response in case of emergency/table no. 1:

Stakeholder groups	
<i>Local public authorities</i>	<ul style="list-style-type: none"> • Municipalities in the coastal zone (Constanta, Mangalia, Eforie, Sulina and Costinesti, Limanu, 23 August, Tuzla, Agigea, Mihai Kogalniceanu, Corbu, Istria, Mihai Viteazul, Jurilovca, Murighiol, Sf. Gheorghe, C.A. Rosetti)
<i>Regional public authorities</i>	<ul style="list-style-type: none"> • The Prefectures Constanta and Tulcea counties coordinating the Operational Commandment for Marine Pollution • The County Councils of Constanta and Tulcea counties
<i>National public authorities</i>	<ul style="list-style-type: none"> • The Ministry of Environment, Waters and Forests, and CNZC/ The National Committee on Coastal Zone. • The Romanian Waters National Administration (ANAR) • The Ministry of Regional Development and Public Administration • The Ministry of Health • Ministry of Agriculture and Rural Development (MARD), and National Agency for Fisheries and Aquaculture (NAFA) <p>The Ministry of Entrepreneurship and Tourism</p>
<i>Sectoral agency</i>	<ul style="list-style-type: none"> • The Environment Protection Agencies in the counties of Constanta and Tulcea • The South-East Development Region • The Romanian Naval Authority (ANR)

	<ul style="list-style-type: none"> • The National Administration Romanian Waters, Dobrogea – Littoral Water Basin Administration • Danube Delta Biosphere Reserve Administration (DDBRA) Tulcea <p>The National Committee on Coastal Zone (NCCZ)</p>
<p><i>Infrastructure and (public) service providers</i></p>	<p>The Romanian Naval Authority is the central specialized authority under the Ministry of Transport and Infrastructure, in the field of navigation safety and ship security. The central apparatus of the ANR is composed of the functional services, the Navigation Safety Directorate, the Security of Ships and Seafaring Personnel, the Technical Directorate, the Legal Directorate, Regulations and Human Resources, the Economic Directorate, the Maritime Coordination Center and specific Services.</p>
<p><i>Interest groups including NGOs</i></p>	<p>Balkan Environmental Association (BENA)</p> <p>Mare Nostrum- environmental NGO in Constanta, Romania.</p> <p>Oceanic Club</p> <p>The Ornithological Society Romanian (SOR)</p> <p>Romanian Naval League NGO</p>
<p><i>Higher education and research organizations</i></p>	<ul style="list-style-type: none"> • The Romanian Academy • The National Institute for Research and Development Urbanproiect INCERC • GeoEcoMar (National Institute of Research - Development of Geology and Geoecology) • The National Institute for Research and Development Danube Delta (INCDDD) Tulcea • The National Institute for Research and Development in Tourism (INCDT)

	<p>University Ovidius of Constanta</p> <p>"Dănărea de Jos" University of Galati</p> <p>Naval Academy "Mircea cel Batran"</p> <p>Maritime University of Constanta</p> <p>University of Bucharest</p> <p>National University for Science and Technology Politehnica Bucharest</p>
<i>Education/training centers and schools</i>	The Constanța Chamber of Commerce, Industry, Navigation and Agriculture (CCINA Constanța)
<i>Enterprises except SMEs</i>	<p><i>C. N. Administration of Maritime Ports S.A. Constanta</i></p> <p>Constanta Naval Shipyard</p> <p>Damen Shipyards Mangalia</p>
<i>SMEs</i>	<p>Terrasigna SRL,</p> <p>Marinetek SRL,</p> <p>Red Lotus, etc.</p>
<i>International organization, EEIG</i>	<p><i>ESA – European Space Agency</i></p> <p><i>CMEMS – Copernicus Marine Environment Monitoring Service</i></p>
<i>General public</i>	Local communities are the most active factors of development in the area.
<i>Hospitals and medical centers</i>	<i>Public Health Directorate of Constanta and Tulcea</i>
<i>Cross-border legal bodies</i>	<p><i>Black Sea</i></p> <p>General Fisheries Commission for the Mediterranean – GFCM</p>

Needs assessment

As part of the project process, developed (in D1.2) after the identification of the target stakeholder groups, the needs assessment was emphasized the existing training gaps and certain monitoring challenges, materialized in the view of the training curriculum topics, and in the identified training gaps and monitoring challenges.

While some of the appropriate capacities for training the rapid response are present at the national level, there is still no extended expertise in the scientific assessment of oil pollution. The need for continuous identification of associated risks with activities in maritime areas, and the need for continuous preparedness, including training, was manifested during Co-creation workshops, by various stakeholders.

CERONAV, the Romanian Center for the Training and Improvement of Naval Transport Personnel, was established by the Ministry of Transport to address the training and development needs of maritime navigation personnel. In this regard, most training programs primarily focus on routine maritime operations and are aligned with IMO and EU standards. However, there is limited integration of marine pollution emergency response training within existing or mandatory curricula.

National contingency plans exist for oil spill response; however, broader pollution issues (e.g., hazardous substances, eutrophication, microplastics) require further training efforts to integrate the Marine Strategy Framework Directive (MSFD) indicators into Romania's training programs.

The need for modular, practical, and adaptable training was emphasized by certain stakeholders as a part of a marine pollution preparedness and emergency response training curricula, as well as the need for practical exercises, specific trainings on technological developments – EO, DTO/digital monitoring tools, modelling and AI applications/EWS, and pollutants' sources and impacts (of hazardous substances and marine litter/microplastics).

Thus, the key points of the two training programs (short and long-term training) will be focused on and the participants needs in the training. The following steps are foreseen for the planning of a comprehensive and complementary marine pollution training curricula in Romania.

Training content, materials and further requirements

- **Co-designed curricula alignment**

Objective: To enhance preparedness and emergency response to marine pollution in the Romanian EEZ/western Black Sea by supporting early warning mechanisms, fostering cross-agency cooperation, and the integrating modern monitoring and response technologies, while identifying gaps and proposing improvements through advanced training curricula and strengthened cross- institutional collaboration

Actions: Map the contents of the training modules to support the competencies defined in the co-creation process in Romania correlated with regional co-creation. Also, the alignment of the training process to the new operational challenges in Marine Pollution (MP) management; ensure compliance with national and international standards for maritime training and pollution control.

- **Exercises/experiments development** – Syllabus Specifications for selected MP Modules of the training curricula

Objective: Design practical training, exercises and experimental activities that align with the specific syllabus requirements of selected Marine Pollution (MP) training modules for Romania.

Actions: Curriculum specifications for selected modules of the training program for Romania.

Several practical experimental training materials and exercises were developed, as well as certain experimental activities that meet the specific curriculum requirements of selected marine pollution (MP) training modules, prioritized at the regional co-creation workshop, according with the learning outcomes, identified for each module. Performance is measured with tests and scoring system of performance for the module.

The exercises encompass the modern services for real-time data (EO) and MP modeling based decision-support tools (DSS) to simulate realistic MP intervention conditions and operational coordination. The co-designed curricula correlated with training modules for Romania is part of Annex 1.

- **Toolkit/IT Platform Requirements**

Objective: to define the functional and technical requirements for the IT platforms and toolkits that will support the delivery and application of MP training programs and to deliver certain customized marine pollution training programs with several capabilities and IT support systems and data access. Those functional and technical requirements should be adapted to the requirements of the RESPONSE project framework.

Actions: Specify accessibility and supports modularity standards, interactivity and interoperability requirements for the training toolkit, designed as system of digital tools, software, and platforms necessary for real-time simulation, environmental impact data analysis/NEBA, thus ensuring a platform for scalable and customizable training and tools for marine environmental data, EWS/early warning systems, and marine pollution modeling visualization. The toolbox will prioritize user experience, multilingual support, and security compliance in platform adaptable design, allowing the integration with other present learning platforms, webGIS (Geographic Information Systems) based tools, designed to create interactive maps showing the current state of the marine environment; implement data analysis, ML algorithms that can predict potential environmental risks and threats, as well creating automated alerts and notifications for operators and stakeholders.

The multilingual support, and security compliance in platform design will consider the prioritization of the user's experience, to conduct user access at an intuitive and easy-to-use IT secure platform.

Structure the training programme

- **Training Deployment Specifications**

Objective: Establish clear specifications/requirements of a MP training across local, national and regional contexts (institutional and legislative framework).

Actions: Specification of the implementation modes (e.g., in-person, e-learning, hybrid) tailored to different stakeholder groups and operational settings, will be considered together with the setting the timelines - duration, logistical requirements, and resource allocation for effective training delivery, development of the guidelines for trainer certification, participant selection, and evaluation procedures, ensuring the integration with institutional/stakeholders training calendars on emergency response trainings, and continuous preparedness/learning pathways, therefore establishing mechanisms for feedback collection, course iteration, and long-term sustainability.

The specific implementation modes in Romania are designed according with the needs of the identified stakeholder groups, encompassing various authorities and decision-makers and emergency responders, academia, civil society organisations, as well as general public and volunteers. The period for a designed training module is 1 to 1.5 days, considering the resource allocation and coordination for a particular training session. The trainer's selection/certification will be developed based on a specific procedure and the training calendar for Romania will be established and approved in a national training workshop to ensure its integration into institutional and legal frameworks.

The long-term training scheme will consider a course duration of one semester including lectures, seminars, and exercises, for certain stakeholder group of academia and universities, interested in regular and extracurricular programmes and studies, in online platforms and tools.

Develop training materials

The development of the National Training Course materials in Romania was guided by three core principles: relevance to the local context, alignment with international standards, and long-term reusability. All materials were created in close collaboration with RESPONSE project experts and adapted to the specific institutional, legal and environmental realities of Romania's Black Sea coastal region. To ensure accessibility and inclusivity, the content was prepared in both Romanian and English, with a particular focus on the terminology used in national emergency protocols and regional cooperation agreements (e.g. the Bucharest Convention, the MSFD and the OPRC).

The training package includes a comprehensive Participant Handbook, which serves as a structured reference guide throughout the course. This handbook covers thematic modules ranging from sources of marine pollution and response chains to the use of monitoring tools and inter-institutional coordination mechanisms. Practical elements are incorporated throughout to ensure that participants can apply their learning to real-life scenarios. A Trainer Toolkit has also been developed in a developing stage to support delivery of the course. This includes presentation slide decks aligned with each session, facilitator notes to guide delivery and adaptation, structured group exercises, and a full case study simulation based on a hypothetical pollution event in the adjacent areas of Constanta/Romanian Ports.

The main courses comprise four outcome-based training modules, each of which is tailored to the core competencies required for marine pollution preparedness in Romania. 1) Marine Pollution Governance and Response Chain, focusing on institutional coordination under the Bucharest Convention and Romanian national plans; 2) Monitoring and Forecasting Tools, including the use of Romanian oceanographic infrastructure and data (e.g. NIMRD/CMEMS platforms, moorings and gliders); 3) Emergency Planning and Interventions, adapted to Romanian coastal geography, port infrastructure (e.g. Constanța) and existing emergency protocols; and 4) Public

Communication and Ecosystem Recovery, focusing on stakeholder coordination and public/media relations' strategies in the Romanian context.

Each module follows a structured syllabus with clearly defined learning outcomes, activities and evaluation checkpoints. The modules are designed to be reusable and adaptable for future in-country or regional replications.

Marine Pollution Exercises, Simulations & Assessment Framework. To ensure applied learning, the course includes a realistic, scenario-based simulation on a fictional oil spill incident near the Port of Midia and/or Constanta, an area of industrial risk and ecological value. Participants simulate multi-agency coordination using actual Romanian protocols (e.g. the involvement of the ANR, ISU and ARBDD). An assessment framework has been developed to evaluate knowledge acquisition, decision-making performance during the simulation and interagency collaboration. This includes both formative assessment (e.g. quizzes and team feedback) and summative components (e.g. a final test and self-assessment).

Teaching methodology: This approach blends preparedness-oriented training, such as planning, monitoring and institutional roles, with rapid response capacities training, such as operational decision-making, logistics and real-time communication. Preparedness blocks focus on risk awareness, policy and planning exercises with a relevant methodology adapted to Romania's institutional framework. Response toolkit blocks will be designed to simulate time-critical decision-making, following a methodology of capabilities assimilations under stress, based on Romania-specific operational scenarios.

The training design incorporates peer learning and reflective practice, in line with national civil protection against pollution standards and the Romanian Professional Training Accreditation framework.

Teaching platforms: Delivery is supported through a hybrid platform model that facilitates in-person sessions at the NIMRD Constanța training facility (with a digital projector and breakout group capabilities) and remote participation via Microsoft Teams or equivalent platforms to ensure accessibility for institutional participants from Tulcea, Bucharest and regional centers. Access is also provided to e-learning modules hosted on the RESPONSE training website (in partnership with the NIMRD IT team) to allow asynchronous learning. The toolkit platform will assure the specific online delivery/access to the training's modules

CMEMS-DSS/Toolkit demonstrators' setup. This special segment of the course introduces trainees to using Copernicus Marine Environment Monitoring Service (CMEMS) downstream data for emergency MP situations.

Thus, Black Sea Monitoring and Forecasting Centre (BS-MFC) data access via the CMEMS portal, demonstration of decision support systems (DSS) in several downstream services developed for western Black Sea, based on metocean forecast and real-time oceanographic forecasts for wave height, currents and sea level anomalies in Romanian waters, hands-on tutorial using QGIS, MOHID Studio and Python-based visualizations to extract and analyze CMEMS datasets. This practical module is designed for technical staff from ABADL, DSJP, ANR and the environmental division of the Ministry of the Environment.

Toolkit platform development. A dedicated Marine Pollution Response Toolkit is under

development and will serve as a repository for all training materials (in English and Romanian, Bulgarian, Ukrainian and Georgian), scenario scripts and exercises, and data templates and checklists used during the course. The platform is being developed as a modular online hub, which will be accessible via the RESPONSE project website and hosted by AUTH's infrastructure. It is also designed to be scalable and interoperable with regional knowledge platforms (e.g. Black Sea Commission training resources) to ensure long-term utility. The toolkit will also support a potential Training of Trainers (ToT) component by offering self-paced modules, templates for local adaptation and multilingual navigation.

Trainers and facilitation

The Training Course designed for Romanian stakeholders' framework will be facilitated by a team of national and international trainers with multidisciplinary expertise, coordinated by the National Institute for Marine Research and Development "Grigore Antipa" (NIMRD). Trainers will be selected based on their technical expertise, pedagogical skills, and familiarity with MP general problematics and with national legal and institutional frameworks relevant to marine pollution response. Trainers will also act as moderators during plenary discussions, simulation debriefings, and evaluation activities.

To ensure coverage of all thematic areas included in the training modules, trainers must demonstrate expertise in **Marine Environmental Governance and Legal Frameworks**, experience in applying legal provisions to practical pollution response scenarios, must be experienced in designing and facilitating **tabletop exercises, role-playing scenarios**, and **post-event evaluations**, ensuring realism and relevance. Knowledge of Romanian port infrastructure and emergency logistics is important.

Trainers must understand the structure of Romania's **national contingency plan**, the chain of command in pollution incidents, and the role of coordination/Constanta Prefecture and key institutions such as the **Romanian Naval Authority (ANR)**, **General Inspectorate for Emergency Situations (IGSU)**, and **Environmental Guard**. Ideally, they should have prior experience in field exercises or real incident management. The supporting tools such as **Marine Pollution Monitoring and Forecasting Tools** require certain technical competence of trainers in operational oceanography, with emphasis on the use of **Copernicus Marine Service (CMEMS)** data for the Black Sea, Marine pollution dispersion models, Remote sensing, in situ data collection (gliders, buoys), and GIS-based environmental assessments.

Evaluation and Monitoring

The evaluation approach incorporates formative (ongoing, process-based) and summative (end-of-course, outcome-based) methods to support continuous improvement, participant engagement and institutional learning. The primary goals of the evaluation and monitoring component are to measure participants' knowledge acquisition, assess the relevance and applicability of the training content, evaluate trainer performance and the training methodology, collect feedback to refine and replicate future courses, and document learning outcomes and good practices for the RESPONSE project's regional (BSBasin) knowledge base.

The evaluation will be conducted using a multi-instrument approach, administered online or on-site at the beginning of training schemes. This will comprise a pre-training survey relating to participants' expectations and their baseline knowledge of marine pollution concepts, tools and

response roles, as well as their institutional needs and prior experience of pollution events or training. Daily feedback forms comprising short, structured questionnaires will also be used to assess content clarity and relevance, engagement levels, trainer performance, and logistical arrangements and materials at the end of each training group module/day.

A standardized test comprising multiple choice/short answer questions will be applied at the start and end of the course to evaluate learning gains. Trainers will use structured scoring rubric to provide constructive feedback during the debriefing.

A post-training evaluation form (final feedback) will be completed by all participants to capture their overall level of satisfaction with the course content and structure, the perceived usefulness of it for their professional role, and their recommendations for future editions or advanced modules.

An internal trainer debriefing session will be conducted immediately after the course. Trainers and facilitators will review the effectiveness of the session and the group dynamics, identifying strengths and areas for improvement. The resulting internal report will be shared with the project coordination team and used to refine future national or regional RESPONSE training sessions and its associated practicals.

Indicators and reporting: All monitoring data will be compiled into a Course Evaluation Report and shared with national stakeholders, the RESPONSE consortium, and archived as part of the project's deliverables. Selecting insights may also inform policy briefs or capacity-building strategies at a national or regional level.

Responsible for information collection: Romanian coordinator and the team

Reporting: in writing, one month after the completion of T3.1.

Follow up and sustainability

The Training Scheme for Romanian nationals/stakeholders is designed not as a one-off activity, but as a catalyst for long-term capacity development in marine pollution preparedness and response. As such, a structured **follow-up strategy** and a forward-looking **sustainability plan** have been embedded from the design stage.

A set of concrete follow-up actions will be developed by NIMRD to ensure that the knowledge, skills, and tools acquired during the course are applied, multiplied, and further developed beyond the initial delivery.

Certificate and Acknowledgment of Competence. All participants will receive an official certificate of participation co-signed by NIMRD and the RESPONSE coordination team, specifying the completed modules and learning outcomes. This may serve as a basis for future career advancement or institutional recognition.

Access to Training Repository/Response Toolbox. Participants will receive access to a digital repository containing all course materials, case studies and simulation, video recordings (where available). Supplementary readings and links to CMEMS and other data sources connected to RESPONSE toolbox.

Post-training Community of Practice. A dedicated online group will connect participants, trainers, and RESPONSE partners. This will serve as a platform for continued dialogue, experience sharing and alerts on upcoming events and new tools. A selection of motivated and high-performing participants will be invited to a future extension of the modules, with the goal of enabling replication of the course within their institutions or regions. This helps expand RESPONSE's impact through knowledge multiplication in Romanian Env. professional space.

Feedback collected during and after the training will be used to update and improve future editions. Results will also feed into the development of a Regional Training Catalogue for the Romanian area but, also for Black Sea basin.

Stakeholder Engagement and Future Integration. Active stakeholder participation is at the core of both the immediate follow-up and the long-term integration of the course into national systems.

Institutional anchoring: National institutions such as the **Ministry of Environment, Romanian Naval Authority (ANR)**, and **General Inspectorate for Emergency Situations (IGSU)** involved as beneficiaries, their ongoing involvement will support Integration of training modules into **national contingency planning exercises**; Institutional accreditation or endorsement of future training sessions as well Policy alignment with RESPONSE recommendations.

Integration into broader systems

To ensure that the training course has a long-term, system-level impact, efforts have been made to integrate it into broader institutional, policy, and operational frameworks at the national and regional levels. The course is not conceived as a stand-alone initiative, but rather as a strategic building block within Romania's and the Black Sea region's marine pollution response architecture.

The training course is fully aligned with Romania's existing frameworks for marine environmental protection and civil contingency planning, including the **National Marine Pollution Contingency Plan**, coordinated by the Constanta Prefecture, with direct support of the Ministry of Environment and the Romanian Naval Authority (ANR), as national responsables under the EU/regional legal framework, including **Bucharest Convention** and its Protocols, Risk reduction and emergency preparedness strategies will be proper considered in the training scheme at wider scales, in connection with national one coordinated by the **General Inspectorate for Emergency Situations (IGSU)**.

The content developed for the course will support the implementation of the roles and responsibilities defined in existing plans. The modular design of the course allows for its **integration into sectoral training programmes** and its integration within academic curricula. The training content complements existing EU-funded projects and instruments in Romania, including **POIM (Operational Programme for Infrastructure)** implemented together with Bulgaria, permitting future BSC supported initiatives.

Interoperability with EU and Regional Mechanisms

The training approach and content are designed to be interoperable with broader European frameworks, in particular The **Marine Strategy Framework Directive (MSFD)** and the operationalization of **Descriptor 8 (Contaminants)** and **Descriptor 10 (Marine litter)**, referring to the

EU Civil Protection Mechanism (UCPM) and its capacity-building objectives, facilitating the complementary use of the **Common Emergency Communication and Information System (CECIS Marine Pollution)** platform, through which Romanian authorities can report and coordinate cross-border incidents.

1.4 National Training course in Ukraine: National operation plan on marine pollution preparedness and emergency response training

This training program aims to enhance the preparedness and response capacities of Ukrainian state authorities, local governments, non-governmental organizations (NGOs), and specialized institutions involved in monitoring and addressing marine pollution emergencies—particularly those resulting from armed conflict. Key stakeholders include one of the most influential and the relevant stakeholders - the State Organization “Administration of Ukrainian Sea Ports” (or Ukrainian Sea Ports Administration (Authority) - USPA).

The principal components of the training program include its defined objectives, the geographical scope—centered on Ukraine’s coastal and maritime zones—the targeted categories of pollution, and the profiles of participating stakeholders. A set of preparatory steps has been outlined to support the development of a comprehensive marine pollution training framework tailored to the Ukrainian context.

Purpose and scope of the training course

In light of Ukraine's current capacities for preparedness and response to marine pollution incidents, the following core training objectives have been delineated

• Objectives of the training course:

- to improve the understanding of local government units and civil protection authorities regarding their roles in marine pollution emergency response and post-incident recovery;
- to provide targeted training to personnel from relevant administrations, institutions, and agencies on marine pollution response procedures aligned with national and international legislative frameworks;
- to familiarize competent authorities with new technologies for real-time monitoring and immediate response to marine pollution events;
- to strengthen operational capacities of environmental authorities, emergency response units, and other stakeholders to manage pollution incidents arising from or exacerbated by armed conflict;
- to support the training of civil engineering students at the Kherson State Maritime Academy on the topic “Response to Disasters and Accidents in the Black Sea.”;
- to facilitate the training of volunteers for active participation in joint naval and marine exercises focused on marine pollution preparedness and response;
- to support training of environmental and emergency response personnel with the skills for rapid assessment, rescue, and rehabilitation of oiled or contaminated marine fauna.

• Geographical Coverage: Specify regions/countries/coastal zones covered.

The training course is designed for implementation at the national level in Ukraine. It focuses on the Black Sea coastal area, encompassing relevant regional and municipal administrative units, and the designated maritime zones as defined by Ukrainian legislation, including the national maritime search and rescue area. These zones fall under Ukraine’s national responsibility for marine environmental protection and outline the specific mandates of relevant institutions in

situations involving maritime emergencies, preparedness efforts, and response to pollution incidents—particularly those linked to war-related impacts.

As of today, there is no officially approved methodology in Ukraine for assessing contamination caused by militaristic impact. Due to martial law, pollution data are being collected for the air and coastal areas, but not for the marine environment, owing to security constraints and prohibitions imposed by the armed forces.

- **Pollution Types:**

- **Monitoring, preparedness**

The training plan envisages pollution types identified in the monitoring and assessment framework on marine pollution within the RESPONSE project (M2). The evaluation of the monitoring and assessment framework on marine pollution in Ukraine that is used in the project is mainly based on the foundational document for evaluating the monitoring and assessment framework on marine pollution in Ukraine is the Marine Strategy Framework Directive (MSFD) — Directive 2008/56/EC of the European Parliament and Council. This directive establishes a comprehensive framework for achieving Good Environmental Status (GES) of marine waters across the EU, including Ukraine as part of its EU integration efforts. Therefore, key supporting instruments include:

- Commission Decision (EU) 2017/848: Defines criteria and methodological standards for assessing GES, including standardized methods for monitoring marine pollution.
- Status of Environment and Climate in Ukraine (2025): A Joint Research Centre (JRC) report that benchmarks Ukraine's environmental performance, including marine pollution, in the context of EU accession and Chapter 27 of the EU Acquis.
- Groundwater Monitoring Development Plan (EUWI+): While focused on groundwater, it complements marine assessments by aligning Ukraine's water monitoring systems with EU Water Framework Directive standards.

The aforementioned documents collectively guide Ukraine's alignment with EU environmental legislation, particularly in the Black Sea region, and form the basis for evaluating marine pollution monitoring frameworks.

The pollution types addressed in the training plan focus primarily on: pollution with contaminants (heavy metals), oil, eutrophication (nutrients), marine litter/ Parts of the training will touch on to the other pollution types identified above depending on the topic. The training plan will involve, pollution caused by armed conflicts (including a complex of pollution types).

- **Emergency response**

The plan includes training initiatives focused on pollution types linked to emergency situations, with particular emphasis on marine contamination arising from armed conflicts, oil discharges and spills, as well as chemical releases.

The training content is informed by National Contingency Plan (NCP), documented analyses of prior incidents, and research related to pollution resulting from military actions.

Following the Kerch Strait oil spill, UNEP coordinated a multi-sectoral assessment that recommended strengthening Ukraine's strategic policy and contingency planning for marine pollution emergencies.

In 2025, UNDP and Sweden provided laboratory equipment and training to the State Environmental Inspectorate of Ukraine as part of support initiatives aimed at eliminating pollution resulting from war-related incidents. These efforts have strengthened the Inspectorate's capacity to monitor and respond to oil spills in the Black Sea, particularly in the Odesa and Mykolaiv oblasts (regions).

While Ukraine has made progress, the development of a **comprehensive NCP** aligned with EU and REMPEC standards remains a priority.

Identify the stakeholder groups to be involved

- **Identify relevant stakeholders.**

The *key stakeholders* in sphere of marine pollution response in Ukraine have been identified at the start of the Project (in D1.1). Their identification was provided on the basis of the national legal framework analysis, collecting data about stakeholders from professionals, and then – with help of surveys and interviews. Short initial list of stakeholders on national level was prepared:

Ministry of Environmental Protection, State Emergency Service of Ukraine, Department of Ecology of Odesa Regional State Administration, State Ecological Inspection of Ukraine, Ukrainian Scientific Center of Ecology of the Sea, Izmail State Humanitarian University, National Shipbuilding University "Admiral Makarov", National Environmental Center of Ukraine, Institute of Econology, Zeleniy List CO, Afalina CO.

The list is not exhaustive and was extended during further analysis and performing the next deliverables.

As a result of the further analysis one of the **most relevant** key-stakeholders was identified, namely: the State Organization "Administration of Ukrainian Sea Ports" (or Ukrainian Sea Ports Administration(Authority) - USPA). This stakeholder played one of the most significant roles for co-creation process(D 2.1).

- **Conduct a stakeholder analysis:** influence, capacity, and role in preparedness/response.

Our team in Ukraine have grouped and classified all stakeholders as:

- decision-makers in marine pollution response,
- relevant administrations and agencies responsible for the state of the marine environment and training,
- research institutes, universities,
- training centers,
- Associations of coastal and marine economic sectors,
- Marine / coastal environmental protection NGOs

- Volunteer groups, regional organisations, programmes, projects.

The total number of potential stakeholders analysed is 172, namely:

- Decision-makers involved in marine pollution response (5 potential stakeholders identified),
- Administrations / Agencies responsible for the state of the marine environment and training for marine pollution response (31 potential stakeholders identified),
- Universities, Research Institutes, Training Centres (31 representatives identified),
- Associations of coastal and marine economic sectors (48 potential stakeholders identified),
- Marine / coastal environmental protection NGOs (51 representatives),
- Regional organisations, programmes, projects (2 relevant projects identified).

The number of key stakeholders that were identified as the most relevant for the Project aims, according to the institutional roles, responsibilities, structure, needs, and training capacity in Ukraine - is 11.

But training programmes have the least of the stakeholders that provide training courses or involved in the process of quick response. This feature decreases the **influence** of such stakeholders on the state of play.

Some of the stakeholders, such as The State Emergency Service of Ukraine are not available for the communication and study within the Project because of the martial law restrictions. And the information about their training courses and abilities is also with restricted access.

State ecological service of Ukraine and the Department of Ecology of Odesa regional state administration have trainings, dedicated to different types of pollutions, but reactions on marine pollutions are described in the training courses mainly in the aspect of reaction on oil spill. There are some knowledge bases (that actually play role of the courses) that are dedicated to pollution and litter response, for instance, caused by plastic and micro-plastic emission. There are no common training programs that are available for use by different actors. Universities, namely, Odesa maritime academy, Odesa marine university, Kherson maritime academy (now relocated in Odesa) have training courses dedicated to different types of pollution but mostly they are not coordinated with real actors, i. e. organizations that really act for prevention and mitigation of marine pollutions.

The capacity and the role Ukrainian stakeholders in the sphere of marine pollution response are defined by actual conventions and national legislation that regulate legal relations and interactions in the Black Sea basin (*in particular, MARPOL - MARPOL /78; Bucharest Convention for the Protection of the Black Sea against Pollution of 1992; Merchant Shipping Code of Ukraine; Law of Ukraine "On Environmental Protection"; Law of Ukraine "On Sea Ports"; "Maritime Strategy of Ukraine until 2030" and others*).

Stakeholders in this matter are state bodies, business entities, supervisory/control bodies, and the public. The procedure for stakeholder interaction in the prevention, detection and elimination of marine pollution was identified in our study and 2 main groups of the stakeholders (actors) were

detected:

1) Ministry of Environmental Protection and Natural Resources of Ukraine (Ministry of Environment) which forms and implements state policy in the field of environmental protection of marine ecosystems with its' acting body - The State Ecological Inspectorate of Ukraine is a central executive body that implements state policy in the field of environmental protection, including in the areas of prevention, detection, localization and elimination of emergencies related to marine pollution;

2) The Ministry of Community and Territorial Development of Ukraine with its' acting body - State Enterprise "Seaports Administration of Ukraine" is a state institution that carries out measures to organize and ensure the safety of navigation within the water areas of seaports and on the approaches to them, complies with the norms and requirements of the legislation of Ukraine regarding environmental protection, rational use and reproduction of natural resources and ensuring environmental safety through the units of the environmental safety service in the ports of Ukraine by implementing measures to prevent/prevent pollution of the water area of ports and approach channels by discharges from vehicles (vessels and other watercraft) and port coastal facilities.

The procedure for stakeholder interaction in the prevention, detection and elimination of marine pollution is established by the Resolution of the Cabinet of Ministers of Ukraine dated July 17, 2019 No. 670 "On approval of the procedure for interaction of the state enterprise "sea ports administration of Ukraine" and the state environmental inspectorate to ensure compliance with environmental protection legislation in the event of detection of cases of discharge of pollutants by vessels (floating vessels) within the seaport water area".

In the aspect of capacity, and role in preparedness/response estimation we have identified one of the most serious problems: there is no systemic process of the professionals preparing in the response sphere. Some marine and seafaring professionals pass trainings as part of their education programme in order to be qualified as employees.

All the relevant information about training courses for the professionals, that are ready for quick response in military aspects, including sea-border authorities, sea-police, State emergency service specialists now is restricted for use because of the martial law.

The project team has not identified any life-long-learning on marine pollution that is taught institutionally. There are self-education programmes and practices among employees of the key stakeholders.

One of the best conditions for anti-pollution training on the sea had Kherson State Maritime Academy (KSMA), including special equipment, facilities and trainers. But now the territory of KSMA is temporarily occupied by russian militaries and all the staff of KSMA is evacuated to Odesa.

For now the complex of trainings, equipment and other capabilities has Administration of Sea Ports of Ukraine.

The State Organization "Administration of the Sea ports of Ukraine" (ASPU) obtained training equipment from specialized producing and trading corporations as advertising sample in order to

test to promote new types of equipment. ASPU uses **the schemes of state-private, public-private partnership** and cooperation.

As for NGOs, engaged in response-oriented trainings, the most of its funding is formed due to the projects, supported by International or European funds.

- **Involve stakeholders in co-designing the training agenda**

The following groups of the stakeholders have been identified in the process of preparation for the co-creation workshop. They are target groups for the co-design of the training agenda and they were the main stakeholders that took part in the interviews:

1) authorities, decision makers, representatives of administrations and institutions, state administrations, departments, local communities, volunteers, NGOs, media etc. – interested in short-term courses for professionals, problem-oriented training, use of the project online platform, digital tools and data-bases (namely State Environmental Inspectorate of the South-Western District; Department of Ecology and Natural Resources of Odesa Regional State Administration, Administration of Sea Ports of Ukraine; the Ukrainian scientific center of Ecology of Sea (UkrSCES).

2) representatives of scientific institutions, universities, distance learning students, other maritime professionals - interested in education obtaining, graduation and magister-degree-studies, use of institutional research and education infrastructure (Kherson State Maritime Academy - Kherson State Maritime Academy (KSMA); Odesa State Ecological University, Odesa National University named after I.I. Mechnikov).

One of the best abilities to involve the main stakeholders in co-designing the training agenda have been the co-creation workshop with attendees from the Odessa, Mykolaiv, and Kherson regions of Ukraine representing key stakeholders from the RESPONSE perspective: State Organization "Institute Of Market And Economic&Ecological Researches of the National Academy of Sciences of Ukraine", the Black Sea Branch of the Ukrainian Ecological Academy of Sciences, Department of Ecology and Natural Resources of the Odesa Regional State Administration, Department of Environmental Management of the Administration Board of the State Enterprise "Administration of Sea Ports of Ukraine", Department of Marine Environment of the Odessa Region, State Ecological Inspectorate of the South-Western District (Mykolaiv and Odesa Regions), Ukrainian Research Institute of Medical Rehabilitation and Resort Therapy of the Ministry of Health of Ukraine, Ukrainian scientific center of Ecology of Sea (UkrSCES), Institute of Climate-Oriented Agriculture of the NAAS of Ukraine, State Institution "Institute of Marine Biology of the National Academy of Sciences of Ukraine", Kherson State Maritime Academy, Odessa I.I. Mechnikov National University, Odesa National University of Technology, Institute of Artificial Intelligence and Robotics of Odesa Polytechnic National University, National Natural Park "Kuyalnytskyi".

Needs assessment

During the D.1.2. implementation, preparing the M1 report and during the co-creation workshop the following existing training gaps and challenges (needs) have been identified:

Training gaps and monitoring challenges:

- Ukrainian actors in sphere of the response-training require more systemic and net-work-supported training scheme with better **financial and technical support** in order to improve

national response capacity.

- Data collection is restricted by the martial law. Some available aspects of the data collection is fragmented and carried out by different agencies (e.g. the Ukrainian scientific center of Ecology of Sea, State Ecological Inspection, The Institute of Marine Biology).
- There are no national plans and protocols of quick response available for the study, because of the martial law. The materials are available for the State Emergency Service, Marine Guardians, Sea Police and other representatives of the defense forces.
- There is low degree of the involvement of professionals and trainers into the curricula realization;
- Destroying of the huge part of equipment for training as result of the war.

The training capacity of the Stakeholders in sphere of marine pollution response readiness is formed by Equipment Availability. The most of the equipment of Universities, Scientific Organizations, State (regional) authorities is purchased due to the funding from the state budget and local budgets. European or International funding and material support also play significant role in the process of capacity building. Especially since full-scale military invasion in Ukraine the material and financial support of emergency services plays great role.

The response training capacities of NGOs is formed, mainly, due to the European or International projects support.

The most of the training courses in Ukraine **use ICT tools** for communication, monitoring, data collection, common-use data bases creation and for reporting, dissemination of necessary information and basic knowledges that are especially actual since the war challenge.

But there is a great demand on more **digitalized and real-time interactive** services of all response-oriented processes. And this is one of the needs and challenges that lies ahead of Ukrainian and all Black Sea basin stakeholders.

The main gaps and needs for the training programmes in Ukraine are formulated in D.1.2 report and in Milestone 1, namely:

- Lack of financial and technical support
- Lack of networks for the data exchange and cooperation
- The data on emergencies are restricted for public
- Lack of trainers with experience
- Lack of methodological support
- Lack of obligations to organize the "response-oriented" training course
- Lack of early warning in training course

Stakeholder Recommendations addressing specific training needs

The main Stakeholder Recommendations addressing specific training needs have been collected

during interviews and national co-creation workshop. The co-creation workshop has gathered the key stakeholders which jointly participated in creation of training modules and specific materials covering the topics of active and effective response to pollution and environmental safety issues.

The workshop's conclusions (Milestone 6 and D2.1) include proposals:

1. In the training programs, three main cases are to be considered:

- a) pollution prevention cases and protocols;
- b) restoration of the marine environment (including monitoring of the aquatic environment, detection of pollution, elimination of pollution, restoration of the environment with the involvement of the best scientific world practices);
- c) preservation of the natural environment (including state and public control, establishment of agreed standards for the use of natural resources at the state level, inevitability of punishment for damage caused to the environment).

2. Include into the training programmes methodics for evaluation of damages to marine ecosystems caused by armed conflicts. Add to the training programmes interactive modules dedicated to study of the best practices for reaction on marine pollution as a result of armed aggression or rough violation of rules in the sphere of maritime activity providing economic activities.

3. It was also recommended to amend the Bucharest Convention by a separate Protocol, taking into account the armed aggression of the Russian Federation (the so-called military impact on the environment or military pollution).

4. The participants of the co-creation workshop discussed the need to create a single information platform for monitoring pollution and coordinating actions in the realm of marine ecology

5. The concept of integrating innovative technologies into the process of training future specialists should be put into practice.

6. Special emphasis should be made on field-trainings, case studies and involving of real professionals and practitioners to the study process. In this context the **economic aspects for training courses implementation** should be considered, in order to form the abilities of financial provision for professionals and practitioners engaging as lecturers in the study process.

7. The co-creation of clusters of modules for education and training programs should be divided by focus groups, namely: 1) students; 2) representatives of controlling bodies at the state, regional or municipal level; 3) environmentally conscious population

8. The training programs should be designed especially for:

- Universities studying process (for 1 or more semesters)
- Rapid training courses (duration 1-2 weeks)

The training courses for Universities should meet all the requirements of high education quality assurance

9. Breakdown of the general training program **into 4 subprograms** aimed directly at each target group of stakeholders. It was proposed to define the following types of applications:

- advanced training courses for specialists working in this industry, as well as for representatives of local governments and politicians ("decision makers")
- microcredit programs that allow a specialist from another field to gain competencies that make it possible after the study successful completion to work in this field
- training courses for Universities and Scientific Institutions
- general awareness programs for the population and volunteers

10. Some modules that are dedicated to the most frequently encountered types of pollution should be extended (namely, oil spills and disasters with chemical cargoes on the Black Sea)

11. The aspects of the use of AI in processes of modelling of situations, for forecasting the possibilities of pollutions etc. should be highlighted in the training course + **Interactive modules on institutional support** should be proposed.

12. To extend the number of groups of the stakeholders by **adding the 4th group of stakeholders "Population of Black Sea Basin Countries"**. Because there are a lot of volunteers that are in need of trainings and knowledge on how to be ready to help authorities in disasters-pollutions mitigation

13. For each module of the program, it is necessary to clearly determine what competence it forms (1 competence for one module is enough).

At the Co-creation workshop it was declared that a lot of work has been done to analyze the existing training programs of this direction. And the program being developed is aimed at eliminating the identified gaps in competencies that are required. With this approach, the logical chain becomes actual: "Identified competencies that are not taken into account in existing programs → a list of training modules that form these competencies → an analysis of what competencies are needed for individual target groups → create training programs for these groups of stakeholders"

14. Add Module "Involvement of the population and volunteer organizations to eliminate the consequences of emergencies in coastal areas"

15. Add Module "Response to Pollution and littering caused by military actions"

Special sessions

It was proposed to add the following Special sessions:

Special Session 1 - Vessels in distress

- Types of ship accidents (e.g. capsizing and listing, collision, contact, fire or explosion, hull damage, etc.)
- Impact on ecosystems and biodiversity

- The need for help: the role of places of refuge
- Safe ship recycling
- Examples of selected incidents in the BSB – facts and assessments of tanker wrecks, etc.

Special Session 2 - Pollution and littering caused by military aggression

- Types and scale of pollution and blockages of the marine environment as a result of military aggression
- Methods, protocols, measures to prevent and respond to pollution and **littering** as a result of military aggression
- Features of practical measurements of impact and calculation of damage to marine ecosystems
- Examples of reactions (Kakhovska HPP, Kerch Strait fuel oil spill and others) and the practice of training equipment use, simulators involving

Define training content, materials and further requirements

• Co-designed curricula alignment

The co-design process will be supported in Ukraine by the IMEERNASU and BSB UEAS with help of the stakeholders.

Objective: relevance and topicality of the training programme content in order to meet actual requirements and form readiness to quick response on new challenges

Action: the IMEERNASU and BSB UEAS with help of the key-stakeholders (especially with Administration of Sea Ports of Ukraine) and all other actors organize actualization of the structure and approaches, methods, content of the curricula.

• Exercises/experiments development – Syllabus Specifications for selected MP Modules of the training curricula

Objective: Design scope of exercises, practical training and experimental activities that align with the specific syllabus requirements, modern policies and practical demand in the sphere of Marine Pollution (MP), especially training modules that respond on challenges of disasters caused by military actions for Ukraine.

Actions: To form the scope of actual practical exercises Ukraine that meet the specific curriculum requirements of selected Marine Pollution (MP) training modules. especially training modules that respond on challenges of disasters caused by military actions for Ukraine. Also the list of the selected modules is to be defined according to the priorities identified during the national (and regional) co-creation workshops.

The general and specific learning outcomes will be defined according to the modules objectives and needs of the stakeholders, identified during the co-creation sessions.

The practical exercises will support all the theoretical learning materials, will help to form practical

competencies in the sphere of the MP reaction. Thematically, practical exercises are foreseen for all the training modules and special sessions that are proposed as a structure of the curricula for Ukraine (see Annex 1).

• **Toolkit/IT Platform Requirements**

Objective: to identify actual parameters for the learning platforms, toolkits, IT-tools, means of AI for the better implementation of the Marine Pollution reaction training programmes.

Special emphasize has already been made on the development of common interactive database for Marine Pollution quick reaction and mitigation measures defining.

Actions: to plan and to organize the use of the common and specific platforms, toolkits, digital platforms for the use in the process of the curricula delivery.

Due to the key stakeholders (namely: Department of Ecology and Natural Resources of the Odesa Regional State Administration, Department of Environmental Management of the Administration Board of the State Enterprise "Administration of Sea Ports of Ukraine", Department of Marine Environment of the Odessa Region, State Ecological Inspectorate of the South-Western District (Mykolaiv and Odesa Regions), Ukrainian scientific center of Ecology of Sea (UkrSCES)) the prospects for the use of the special software (PowerSim and iThink programmes for the Marine Pollution consequences forecasting.

The organizational basis for the use of the learning platforms (Moodle, Google-Clases) is formed due to the activities of the IMEER NASU in the sphere of the higher education quality assurance.

Also due to the IMEER NASU coordinating efforts the South-Ukrainian Scientific Council of AI learning has already been formed and the platform for the better provision of AI use in scientific and education activity is formed.

Structure the training programme

• **Training Deployment Specifications**

The National Training Course in Ukraine would be designed and delivered by key groups of stakeholders (actors): Universities, Scientific organizations, State authorities and NGOs. But the single framework for these actors is to be developed.

We propose to use tailored approaches for the training programme in order to reach: 1) students via universities; 2) professionals (State ecological inspectors, other officials, seafarers port/Coast Guard officers, emergency responders, NGO staff); 3) volunteers and NGO staff.

For the first group the curriculum may be delivered as part of relevant degree programs (e.g. by Odesa maritime academy, Odesa state university, Kherson maritime academy). Theoretical materials and practical (case) studies may be delivered both by education or scientific staff and by practitioners.

For the second and the third groups of trainees the short-term courses may be used, but the difference will be in the level of professional detailization of the training materials, that are given by professional trainers, professors and other authorized staff. May be delivered in on-line and off-line forms, systematically or in case of demand. May be organized by Scientific Institutions, by

Administration of Sea Ports of Ukraine, by State Ecological Inspection, by Universities, NGOs or other authorized organizations.

Develop training materials

The training materials development is to be organized in the manner that allows to take into account all the necessary theoretical basis, practical exercises, relevant up-to-date knowledges, methodologies and techniques.

Development of Training modules The proposals for the training modules are formulated by the IMEERNASU and BSB UEAS experts according to the data of the institutional basis, existing curricula, stakeholders analysis, due to the best practices learning. The actualization of the modules has been performed due to the stakeholders participation, interviews provided and due to the co-creation workshops results.

- **Toolkit Platform Development** (The systemic, interactive, data-supported digital platform is to be created)

Actions: The IMEERNASU and BSB UEAS with help of the stakeholders will be involved in the process of such a Toolkit platform development.

Trainers and facilitation

Recruiting (hiring) of the most relevant trainers is a key element in ensuring the success of the training program. Especially under current war-influence challenges.

The national training course is to be co-created and regularly updated with stakeholders. Ukrainian system of Higher Education Quality Assurance encourages engaging of stakeholders and real practitioners to the teaching activities. So that, the most of educational and scientific organizations in Ukraine already use the stakeholder-engaging approach.

The completion of the first training course under Milestone 7 would serve as one of the best practices and steps for the long-term effort for development and institutionalization of marine pollution-response training courses in Ukraine.

Thus, Ukrainian National Training Course under the RESPONSE project would be a comprehensive, tailored curriculum that addresses modern challenges (such as military actions) and forms actual preparedness to marine pollution response. Besides national and local peculiarities the curricula will meet actual EU and Worldwide tendencies and rules in the field.

Due to the RESPONSE project the training course would stimulate the activating of the marine pollution prevention and quick mitigation knowledge network forming and development.

The IMEERNASU and BSB UEAS efforts will help to the facilitation of the professional trainers engagement.

Evaluation and Monitoring

Project monitoring and evaluation (M&E) is an essential aspect of project management that helps organizations and stakeholders assess the effectiveness and progress of their initiatives. Whether you're working on a community development project, a business expansion, or a non-profit

program, understanding how M&E works is crucial for achieving your project goals. In this article, we'll delve into what project monitoring and evaluation means, how it works, and other important aspects you need to know.

Project monitoring and evaluation are systematic processes that involve collecting, analyzing, and using data and information to track a project's progress, assess its performance, and determine its impact. These processes help organizations and project managers ensure that their projects are on track, identify areas for improvement, and demonstrate accountability to stakeholders, including funders, donors, and the community.

Monitoring is the systematic and routine collection of information from projects and programmes for four main purposes:

To learn from experiences to improve practices and activities in the future;

To have internal and external accountability of the resources used and the results obtained;

To take informed decisions on the future of the initiative;

To promote empowerment of beneficiaries of the initiative.

Monitoring is a periodically recurring task already beginning in the planning stage of a project or programme. Monitoring allows results, processes and experiences to be documented and used as a basis to steer decision-making and learning processes. Monitoring is checking progress against plans. The data acquired through monitoring is used for evaluation.

Evaluation is assessing, as systematically and objectively as possible, a completed project or programme (or a phase of an ongoing project or programme that has been completed). Evaluations appraise data and information that inform strategic decisions, thus improving the project or programme in the future.

Evaluations should help to draw conclusions about five main aspects of the intervention:

- relevance
- effectiveness
- efficiency
- impact
- sustainability

Information gathered in relation to these aspects during the monitoring process provides the basis for the evaluative analysis.

- Monitoring & Evaluation - M&E- is an embedded concept and constitutive part of every project or programme design ("must be"). M&E is not an imposed control instrument by the donor or an optional accessory ("nice to have") of any project or programme. M&E is ideally understood as dialogue on development and its progress between all stakeholders.

- **Setting Clear Objectives and Indicators:** The first step in M&E is establishing clear project objectives and defining specific, measurable, and time-bound indicators. These indicators act as benchmarks to measure progress and success.
- **Data Collection:** Data is the backbone of M&E. During project implementation, data is collected through various methods, such as surveys, interviews, focus groups, observations, and document reviews. This data includes both quantitative (numbers) and qualitative (descriptive) information.
- **Data Analysis:** Once data is collected, it's analyzed to assess the project's performance and impact. Data analysis can involve statistical techniques, qualitative coding, and comparative assessments.
- **Reporting and Feedback:** The results of the data analysis are used to create M&E reports. These reports provide insights into what's working and what isn't. Feedback from M&E reports can inform decision-making and future project adjustments.
- **Learning and Adaptation:** M&E isn't just about assessing past performance but also about using that knowledge to make improvements. Project managers and stakeholders should be ready to adapt their strategies based on M&E findings.

RESPONSE Specific objective 8 (T3.1 Objective): Develop comprehensive operational planning to solidify the application and effectiveness of marine pollution training (baseline target AI.8. – Increased number of operation plans per BS country) - Indicators: I. Tailored training operational plans (3-4)

Result: Developed comprehensive operational plans for effective marine pollution training

Result indicator: Tailored training operational plans; baseline target AI.8. – Increased number of operation plans per BS country.

Impact indicators: (change in target groups, capacities, innovation, plans content etc.):

Learner Satisfaction: We'll assess the overall quality of the training experience by having participants rate selected topics, material delivery, clarity, and usefulness for on-the-job application (on a 1-5 scale). Our baseline is 50% of respondents indicating a satisfaction score of 3, and we're aiming for 50% of respondents to achieve a score of 4. High scores confirm the training content is relevant, engaging, and effectively delivered.

Knowledge Acquisition & Retention: This indicator measures how well trainees master the transmitted knowledge through topic-specific tests. Our baseline is a 50% test success rate, with a target of 70% success.

Long-Term Impact & Application: We'll evaluate the lasting impact of the training by assessing long-term knowledge retention and the practical application of learned skills in daily work. This will be measured through opinion surveys with participating institutions, interviews with key stakeholders, and expert consultations. Our baseline is a positive attitude towards the training, aiming for a marked expression of support and demand for new courses.

Responsible for information collection: country coordinator and team

Reporting: in writing, one month after the completion of T3.1.

Follow up and sustainability

Sustaining the impact of the marine pollution training program is crucial. Upon completion, participants will receive certificates acknowledging their newly acquired skills and knowledge. We'll actively encourage the integration of the training content into national contingency plans and practical exercises, reinforcing its direct application within existing frameworks.

To foster continuous learning and collaboration, we'll establish a network or forum for trained professionals. This platform will facilitate ongoing communication, support, and knowledge exchange. Additionally, annual refresher courses or updates will be planned to maintain and enhance competencies over time.

Project achievements, training outcomes, and lessons learned will be consistently documented and shared through reports, policy briefs, and stakeholder engagements. This ensures informed decision-making and supports the development of effective policies.

IMPEER NAS Ukraine and BSB UEAS are committed to these follow-up activities at the national level. They will continue the tradition of presenting certificates and driving the integration of RESPONSE training content into practical applications and networking events. All project achievements and insights will be shared through various channels to maximize reach and impact.

Integration into broader systems

To ensure the marine pollution training program creates a lasting and wide-reaching impact, we're strategically integrating it into broader systems and frameworks. This means aligning the training content and objectives with existing national emergency response and maritime policies. This approach guarantees consistency and strong support from relevant authorities.

We're also forging strong links with European Union mechanisms and regional Black Sea frameworks. This will foster cross-border coordination and harmonization, significantly boosting regional preparedness and response capabilities.

Furthermore, we'll actively incorporate the training outcomes and best practices into the capacity-building efforts of related projects. This creates crucial synergies, reinforcing the overall effectiveness of marine pollution management.

IMPEER NAS Ukraine and BSB UEAS will lead efforts to align the training content with national policies in Ukraine, keeping EU mechanisms and Black Sea regional frameworks in mind to enhance cross-border coordination and response. Concurrently, MPEER NAS Ukraine and BSB UEAS will focus on integrating RESPONCE training results and best practices into other projects' capacity-building components, maximizing the impact of marine pollution management initiatives.

2. Tasks of the Regional Workshop

The Regional Workshop, which is part of T3.1 Operation Plans on marine pollution training, will take further the process of development of the national operation plans on marine pollution training. It will define and validate the national level operation plans and their basic framework supporting the start of the actual training to selected stakeholders later during the project and making progress toward comprehensive capacity-building educational process and programs on a regular basis. The regional workshop will be held online in September 2025. It has the task to outline the contents of new training courses operation plans and the curricula to be implemented by each Black Sea partner.

During the Regional Workshop the participants will define (i) the objectives of the operation training plans for the courses, (ii) the activities and tools to be used during the training courses, (iii) the stakeholder groups to be involved, (iv) the processes for recruiting new participants and retaining them, (v) key performance indicators (Task 2.2) as well as quality indicators and assessment criteria (e.g. awareness activities, mutual learning activities, update of concepts and new technologies for monitoring and mitigation etc.), (vi) the timeline of the actions and the roles of the training administrators and finally (vii) procedures, guidelines and templates for interacting with participants and stakeholders to effectively collect feedback to be utilized for performance assessment and evaluation (Task 3.3.) as well as for reporting results along with any problems and/or issues encountered during the operation of the trainings.

Training capacity on marine pollution incidents for all involved stakeholders in the Black Sea will rely on the co-created training curricula (Task T2.1) and the operational use of the Digital Toolkit (Task 2.3). Operational readiness will foresee exercises and organization for quick mobilization when requested. In the long-term, operation plans will foresee the participation of a wide range of authorities and organizations (from Tasks 1.1 & 4.2) to accomplish their own future training programs (under the support of Tasks 2.3 and 2.4) and to contribute to the training of trainers.

3. General comments on the Training courses

The RESPONSE participants have identified suitable training modules contents that have been customized for different stakeholder groups. The partners from the Black Sea countries have developed comprehensive operational plans framework to support the practical application and effectiveness of marine pollution training. The national operation plans on the training curricula provide a structured approach aimed at the successful achievement of the trainings' objectives. In the framework of RESPONSE project, all training content will feature a digital component and be integrated with the RESPONSE Digital Toolkit, facilitating flexible, scalable, and user-friendly delivery across stakeholder groups. The marine pollution exercises, simulations and assessment framework envisage the design of versatile and replicable exercise templates adaptable to different marine contexts and pollution scenarios. Teaching preparedness and response methods have also been planned. The alignment of regional mechanisms with the European Union emergency response structures and agencies is envisaged to promote coordination and harmonization across borders, enhancing the Black Sea countries preparedness and response capabilities.

4. Conclusions

The RESPONSE partners from the Black Sea countries have involved key stakeholders in the co-creation process and have prepared the outlines of their national operation plans on training curricula with defined objectives, activities and tools for the training courses, stakeholder groups, and process of addressing the specific needs on country level. They are taking steps toward planning and holding the physical training and identifying suitable trainers to involve in the training process, especially in view of their expertise, experience and links with the stakeholder groups. The national operational plans when finalized will also include the processes for recruiting new participants, key performance indicators, timeline of the actions and the roles of training, procedures, guidelines and templates for interacting with stakeholders and reporting results along with any problems and/or issues encountered during the operation of the trainings.

Annex 1 – National plans of curricula for Training Courses on marine pollution preparedness and emergency response

Training course for Bulgaria - National plan for training on marine pollution preparedness and emergency response

The National plan for training on marine pollution preparedness and emergency response incorporates stakeholder feedback to ensure relevance to real-world needs. Modules and basic information for stakeholders target groups is indicated below with titles and numbers, and basic information.

In addition to the Modules of the project BSNN has included in the Annex 1 the curriculum of the Technical University (TU) – Varna, for the recently approved discipline *Response to Disasters and Emergencies in the Black Sea*, included in the plan for studies of the specialty *Protection of the Population in Disasters and Accidents*. The contents cover RESPONSE topics and the process of its establishment was stimulated by the project co-creation process. The TU curriculum is part of the regular academic programme and its contents of its lectures and exercises will be reflected in the RESPONSE Digital Toolbox in various ways depending on the specific topics. The BSNN will also provide contents from its own sources correlated to the project Modules to be incorporated in the Digital Toolbox.

MODULE 1: INTRODUCTION TO MARINE POLLUTION (TYPES, SOURCES, BLACK SEA CONTEXT)

- Definition, marine pollution types and sources, pollution types
- Marine ecosystems and human impacts, ecosystem services, socioeconomic effects
- Black Sea context – unique characteristics, types and impacts of pollution
- Black Sea national and regional trends
- Pollution from ballast waters and other marine sources, pollution from armed conflicts – case studies

Oil pollution, oil spills and response strategies

Stakeholders: *Academia/students* – reference to the curriculum of TU - Varna; *Communities/NGOS/Volunteers* – types and sources of pollution, Black Sea context, marine litter issues, pollution from armed conflicts, awareness programmes etc – contribution from BSNN

MODULE 2: POLICY AND GOVERNANCE (INTERNATIONAL AND NATIONAL LEGAL FRAMEWORKS)

- International legal framework
- EU Legislation and policy framework, CMA for the BS
- Regional agreements – Bucharest convention etc.
- National legislation for Bulgaria, relation to EU directives

- National oil pollution emergency response plan
- International governance – IMO, EMSA etc.

Stakeholders: *Academia/students* – reference to the curriculum of TU - Varna; *Responders/Decision-makers/Communities/NGOs* – BSNN contribution on the topics from own sources, *RESPONSE* materials and resources.

MODULE 3: MONITORING AND ASSESSMENT (REMOTE SENSING, DATA ACCESS/ANALYSIS, DATA MODELING/EARLY WARNING SYSTEMS)

- Pollution monitoring and assessment: sampling, remote sensing, and in situ measurements
- Analytical methods for detecting pollutants (e.g., chromatography, etc.)
- New technologies for monitoring of the marine environment
- Data analysis and mapping of pollution hotspots
- Case studies on monitoring programs (e.g., UNEP, NOAA, EU Marine Strategy Framework Directive, National, regional) – BS Commission and monitoring programmes and projects with EU and UNEP support
- National monitoring programmes as part of Marine Strategy of Bulgaria, cross-border measures with Romania under EU MSFD

Stakeholders: *Academia/students* – reference to the curriculum of TU - Varna; *Responders/Decision-makers/Communities/NGOs* – BSNN contribution on the topics from own sources, *RESPONSE* materials and resources.

MODULE 4: POLLUTION MANAGEMENT AND RESPONSE (TECHNIQUES, RISK REDUCTION, CLEANUP STRATEGIES)

- Pollution prevention strategies if applicable
- Remediation and cleanup techniques if applicable
- Engineering solutions for wastewater treatment and coastal pollution control
- Technologies in oil spill response, containment and recovery, use of dispersants and booms
- Reducing plastic waste: Policy, recycling, and alternative materials if applicable
- Clean-up operations for plastics and debris

Stakeholders: *Academia/students* – reference to the curriculum of TU - Varna; *Responders/Decision-makers/Communities/NGOs* – *awareness materials and guidelines* - BSNN contribution and own resources.

MODULE 5: PREPAREDNESS PLANNING (NATIONAL PLANS, SIMULATIONS, TRAINING EXERCISES)

- Establishing and maintaining disaster and emergency preparedness in the Black Sea
- National plans, simulations, training exercises
- Technical means for training and planning marine pollution preparedness and response
- Oil spill containment and recovery
- Use of dispersants and booms
- Clean-up operations for plastics and debris
- Bioremediation methods
- Risk assessment, contingency planning, capacity building
- Early warning system, community awareness

Stakeholders: *Academia/students* – reference to the curriculum of TU - Varna; *Responders/Decision-makers/Communities/NGOs* – community awareness, preparedness, work with media - BSNN contribution

MODULE 6: DIGITAL TOOLS AND INNOVATION (INTERACTIVE TRAINING MODULES ON FRIENDLY WEBPAGE/IT PORTALS, MODELING, DECISION SUPPORT SYSTEMS, ML AND AI)

- New technologies in marine pollution monitoring (e. g. UAVs, satellite images, remote sensing, real-time monitoring, AI, machine learning)
- Engaging citizens – the power of crowdsourcing
- Case studies on monitoring programs (e.g., UNEP, NOAA, EU Marine Strategy Framework Directive, National, regional)
- Training modules on friendly webpage/IT portals, modelling, decision support scenarios

Stakeholders: *Academia/students* – reference to the curriculum of TU - Varna; *Responders/Decision-makers/Communities/NGOs* – community awareness, preparedness, work with media - BSNN contribution, RESPONSE materials

MODULE 7: COMMUNITY ENGAGEMENT AND PUBLIC AWARENESS (CITIZEN SCIENCE, MEDIA RELATIONS)

- Engaging citizens in pollution prevention and awareness
- Engaging communities in data collection, citizen science, alternative solutions
- Providing guidelines on community engagement in marine litter prevention

- Response preparedness to wildlife
- Community and volunteer engagement in response to wildlife in need affected by marine pollution
- Media relations and media involvement in contingency plans and emergency response

Stakeholders: *Academia/students* – reference to the curriculum of TU - Varna; *Responders/Decision-makers/Communities/NGOs* – community awareness, preparedness, work with media - BSNN contribution

The modules contents are to be customized for different stakeholder groups as indicated.

CURRICULUM of the Technical University – Varna

for the discipline *Response to Disasters and Emergencies in the Black Sea*,

included in the plan for training for the Specialty *Protection of the Population in Disasters and Accidents*

A. Lectures (Topics)

Topic 1. Specificity of the Black Sea. Vulnerability to pollution. 3 lectures

- 1.1. General characteristics.
- 1.2. Water circulation. Marine currents. Stratification of waters.
- 1.3. Specificity of the Black Sea. Gas regime. Anoxic zone.
- 1.4. Biodiversity specificity.
- 1.5. Vulnerability of the Black Sea.

Topic 2. Disasters and accidents at sea 3 lectures

- 2.1. Disasters at sea
- 2.2. Accidents at sea.
- 2.3. Potential impacts on the marine environment from disasters and accidents. Environmental damage.
- 2.4. Disasters and accidents in the Black Sea

Topic 3. Protection of the marine environment. 3 lectures

- 3.1. Principles in environmental protection.
- 3.2. Preventive measures for environmental protection. Environmental expertise.
- 3.3. Mitigation measures.
- 3.4. Environmental damage. Prevention of and response to environmental damage.

Topic 4. Prevention of accidents at sea 3 lectures

- 4.1. Strategies to prevent accidents at sea
- 4.2. Removal and clean-up techniques
- 4.3. Engineering solutions for wastewater treatment and coastal pollution control
- 4.4. Oil spill response technologies

Topic 5. Pollution containment and management 3 lectures

- 5.1. Pollution prevention - strategies
- 5.2. Control of land-based sources of pollution; control of discharges
- 5.3. Control of pollution from shipping and port activities

Topic 6: Pollution containment and eradication. Technical means 3 lectures

- 6.1. Limitation of marine litter input
- 6.2. Technical means for the containment and remediation of pollution in the marine environment
- 6.3. Technical means for the containment and eradication of pollution at the seashore

Topic 7: Establishing and maintaining preparedness for response to disasters and accidents in the Black Sea. 3 lectures

- 7.1. Risk assessment of marine pollution incidents, accidents and disasters
- 7.2. Responsible institutions for marine pollution response.
- 7.3. Response plans.

7.4. Maintaining preparedness for response to marine pollution disasters and accidents.

Topic 8: Activities at sea to reduce and eliminate oil pollution 3 lectures

8.1. Activities at sea. Technical means and response.

8.2. Activities on the shore. Technical means and response

Theme 9. Monitoring and evaluation of the effectiveness of pollution control activities and disaster and accident response activities in the marine environment.

3 lectures

9.1. Monitoring of the marine environment - physicochemical, biological and hydro morphological monitoring

9.2. Assessment of the state of the marine environment.

9.3. Good ecological status. Descriptors of good ecological status of the marine environment

Topic 10. Regulatory and legal framework for protection of the Black Sea from pollution and response to disasters and accidents 3 lectures

10.1. Strategic documents, conventions

10.2. International cooperation at European Union level – directives

10.3. National regulatory and legal framework for the protection of the Black Sea

Total: 30 lectures

B. Seminar exercises

Topic 1. Features of the Black Sea, determining its vulnerability to pollution 3 exercises

1.1. Catchment area. River inflow. Exchange of waters with the World Ocean.

1.2. Waters stratification. Thermocline.

1.3. Water currents.

Topic 2. Sources of pollution in the Black Sea basin. 3 exercises

2.1. Anthropogenic pressure.

2.2. Main pollutants.

2.3. Pollution from land-based and marine sources.

Topic 3. Pollution from disasters and accidents. 3 exercises

3.1. Pollution of coastal marine waters

3.2. Pollution in open sea areas

3.3. Bottom pollution

Topic 4. Effects of pollution on the Black Sea ecosystem and human health 4 exercises

4.1. Impact on marine organisms.

4.2. Bioaccumulation and biomagnification in marine trophic chains

4.3. Risks to human health

4.4. Socio-economic impacts

4.5. Test

Topic 5: Preparedness for action in the event of incidents, emergencies and disasters with pollution of the marine environment 3 exercises

5.1. Risk assessment of pollution incidents, accidents and disasters with pollution of the marine environment

5.2. Responsible institutions for response to marine pollution

5.3. Response plans.

5.4. Preparedness for action in the event of disasters and emergencies with pollution of the marine environment

Topic 6: Protecting biodiversity affected from disasters and accidents polluting the marine environment – case study 4 exercises

6.1. Review of the impacts of pollution on marine communities and ecological groups of organisms

6.2. Protocols for assisting wildlife affected by pollution - marine mammals, seabirds.

Topic 7: Activities at sea to reduce and eliminate oil pollution 4 exercises

7.1. Activities at sea. Technical means and response.

7.2. Activities on the shore. Technical means and response

Topic 8: Risk assessment of alien species introduction 3 exercises

8.1. Alien species.

8.2. Risk assessment.

8.3. Species invasiveness assessment.

8.4. Test.

Topic 9. International cooperation for disaster and emergency response in Black Sea

3 exercises

9.1. Black Sea Commission.

9.2. Strategic documents, conventions

9.3. International cooperation at the European Union level - Directives.

9.4. International cooperation at sea basin level

9.5 Coordination of efforts to protect the Black Sea.

Total: 30 exercises

Georgia: Training Modules and Topics

MODULE 1. POLLUTION IN CONTEXT: CAUSES AND EFFECTS

Overview of marine pollution types and their impacts in the Black Sea. Topics would include: major pollution sources (shipping accidents, land-based run-off, etc.); oil spills and their environmental/ecological effects; marine litter (plastics, derelict fishing gear) and microplastics; eutrophication and nutrient pollution; hazardous and noxious substances (chemical spills); introduction to emerging issues like underwater noise and marine debris from conflicts.

MODULE 2. LEGISLATION AND GOVERNANCE

Legal frameworks and institutional arrangements for marine pollution control. Would cover international conventions (MARPOL and its Annexes, London Dumping Convention, OPRC 1990 and OPRC-HNS Protocol, Ballast Water Management Convention) and Black Sea regional agreements (Bucharest Convention and Emergency Protocol). Reviews national laws of Georgia on environmental protection, maritime space, and contingency planning. Would also discuss roles of national agencies (MEPA, Maritime Transport Agency, etc.) and coordination between institutions during pollution events (national incident command structure).

MODULE 3. MONITORING TECHNIQUES AND TOOLS

Marine environmental monitoring and early warning methods. Topics: design of monitoring programs for water and sediment quality; in-situ sampling techniques and laboratory analysis for pollutants; use of **remote sensing** (satellite, aerial drones) for pollution detection; **GIS** and mapping of pollution data; integration of Black Sea observational systems (e. g. Black Sea SoS portal); introduction to predictive modelling for spill trajectories. Emphasis would be on Georgia's monitoring capacities (National Environment Agency programs) and data reporting to regional bodies (e. g. Black Sea Commission).

MODULE 4. EMERGENCY RESPONSE PRACTICES

Operational response strategies for marine pollution incidents. This module would include **oil spill response** tactics: containment (booms), recovery (skimmers, pumps), use of dispersants and in-situ burning (with decision guidelines); shoreline clean-up methods for oil and debris. Would cover response to chemical spills (HAZMAT response protocols, use of protective gear, dilution/neutralization techniques) and to marine litter incidents (large-scale clean-ups). **Incident Command System (ICS)** principles for managing multi-agency response would be taught and health and safety procedures for responders stressed. The module would feature simulation exercises (e.g. spill scenario drill) to practice coordination and decision-making.

MODULE 5. RESTORATION AND MITIGATION

Post-incident environmental remediation and long-term mitigation. Topics: techniques for habitat and wildlife rehabilitation after pollution events (e.g. cleaning oiled wildlife, restoring saltmarsh or wetland areas affected by spills); **bioremediation** methods (using microbes or plants to degrade pollutants); monitoring ecosystem recovery (indicators of success). Also would address ongoing

pollution mitigation: improving waste management to reduce marine litter input, fostering regional initiatives for habitat protection. Climate change considerations (e.g. resilience of coastal ecosystems to pollution under changing conditions) integrated.

MODULE 6. POLLUTION MANAGEMENT AND SUSTAINABLE PRACTICES

Pollution prevention strategies and reduction of pollutant sources. Module would focus on proactive measures: **pollution prevention plans** for ports & coastal industries; implementing port reception facilities for ship waste (oil, garbage) to prevent illegal discharge; promoting best practices in shipping (fuel quality, emissions reduction) and offshore operations. Would discuss **wastewater treatment** improvements and storm-water management to cut land-based marine pollution. Would introduce technological innovations in pollution control (e.g. oil spill recovery equipment, skimmer efficiency, plastics recycling technologies). Policy tools for pollution reduction (economic incentives, regulations) would also be covered, with examples from Georgia's initiatives and international experience.

MODULE 7. MARINE POLLUTION PREPAREDNESS

Contingency planning and readiness for pollution emergencies. Topics: **Georgia's National Marine Pollution Contingency Plan** – structure, designated authorities, and activation procedure. Review of regional contingency plans for the Black Sea and how Georgia's plan aligns (e. g. Black Sea CBD Emergency Protocol). Identifying gaps and needs in current plans (coverage of pollutants beyond oil, resource needs). Steps to develop or update an effective plan: risk-based approach to define scenarios, assigning roles/responsibilities to agencies and key personnel, securing funding and stockpiling equipment. Training and exercise planning: how to organize regular drills (tabletop exercises, equipment deployment exercises) and incorporate lessons learned. Module would also cover **international cooperation protocols** for assistance in case of a large incident (e. g. Requesting help via the Black Sea Commission, EMSA Marine Pollution Response services, private operators such as oil terminals and ports).

MODULE 8. PREPAREDNESS STRATEGIES AND RISK REDUCTION

Strengthening capacity and resilience against marine pollution. Topics: conducting **risk assessment** of vulnerable coastal and marine areas in Georgia (mapping high-risk sites such as oil terminals, busy shipping lanes, ecologically sensitive zones). Using risk assessment results to prioritize prevention and preparedness efforts. Developing community **awareness programs** and volunteer networks for coastal pollution monitoring and response (citizen engagement to report pollution or assist in clean-ups). Building institutional capacity: training-of-trainers approaches to multiply expertise, creating inter-agency working groups or fora on marine pollution. **Early warning systems** for pollution (e.g. water quality sensors, satellite alerts) and their integration into national response workflow. Overall, this module would emphasize a proactive, inclusive strategy to ensure Georgia is ready to respond quickly and effectively to incidents.

MODULE 9. MARINE POLLUTION RESPONSE OPERATIONS

Advanced management of response actions during a pollution incident. Topics: overview of different **response strategies** and decision-making for various pollution types (comparison of

responding to oil vs. chemical vs. plastic pollution). Deployment logistics: mobilizing resources (equipment, vessels, teams) to the incident site; establishing an incident command post and communications network. Ensuring responder **safety** – risk assessment on-site, use of personal protective equipment, decontamination procedures. Techniques for effective on-site coordination: integrating local responders, national agencies, and international experts under a unified command. **Real-time monitoring** of the incident and response efficacy (using drones, satellite images, water sampling for contaminants, etc). Handling practical challenges: adverse weather, night-time operations, public onlookers, etc. Also, managing the **media and public information** during response (designating spokespersons, delivering accurate updates) to maintain transparency and accountability. This module could use scenario-based drills to simulate complex response operations and teach leadership and teamwork under pressure. Cooperation with private operators and using their response facilities and capacities.

MODULE 10. POST-RESPONSE AND EVALUATION

Concluding response actions and learning for the future. Topics: **Waste management** of collected pollutants and debris – temporary storage, transport, and final disposal of oily waste or hazardous materials in accordance with sound environmental regulations. Criteria and methods for declaring an incident *under control* or *terminated*. **Post-response assessment**: evaluating the effectiveness of the response (Were the spill containment and cleanup sufficient? What was the environmental impact?). Developing post-incident reports and recommending improvements to contingency plans or training (a feedback loop to Module 7). Introduction of **new technologies** to enhance future response – e.g. using **virtual reality** simulations for training exercises or employing advanced decision-support software in command centres. Finally, this module would cover how to institutionalize continuous learning: holding multi-agency debriefings, updating manuals & protocols, and incorporating lessons learned into the next training cycle, thus completing the preparedness–response–improvement cycle.

Training course for Romania - National plan on marine pollution preparedness and emergency response training

The National plan on marine pollution preparedness and emergency response training incorporates stakeholder feedback in co-creation workshops to ensure relevance to real needs within the national and regional, legal and institutional framework, in accordance with the M6/Definition of the training's objectives and plan. Modules and basic information for stakeholder target groups is indicated below with titles and numbers, basic information. The contents will be establishing the basis of the contents of the Digital Toolbox.

Stakeholder target groups:

- 1) government and regulatory bodies: Representatives from environmental administrations, inspectorates, and institutions, as well as decision-makers and emergency response teams, who require practical training utilizing online platforms and problem-based learning to enhance rapid response capabilities to marine pollution.
- 2) educational and research institutions: Scientists, educators, students (both full-time and distance learning), and other maritime professionals, who are interested in extracurricular programs, modular training, and online project tools.
- 3) community and civil society: Training organizations, local communities, volunteers, NGOs, and media outlets, in order to improve their understanding related to marine pollution.

The co-creation workshop in Romania resulted in the proposal of two curriculum outlines, one for short training course on rapid response in case of oil pollution and one for a longer training program on building institutional capacity for Black Sea pollution/litter preparedness & response training.

The following training modules contents will to be customized for different stakeholder groups as indicated:

MODULE 1: INTRODUCTION TO MARINE POLLUTION (TYPES, SOURCES, BLACK SEA CONTEXT)

- Definition of marine pollution
- Overview of marine ecosystems and their vulnerability to pollution
- Overview of human impacts on pollution
- Black Sea characteristics and relation to pollution
- Historical background of pollution and regional / national trends

Stakeholders: government and regulatory bodies, educational and research institutions, community and civil society

MODULE 2: BLACK SEA GEOGRAPHY AND CHARACTERISTICS, INFLUENCE ON POLLUTION

- Black Sea geography, hydrography, unique characteristics, wave regime, mesoscale and sub-mesoscale currents
- Black Sea biodiversity and nature resources
- Overview of marine ecosystems and their vulnerability to pollution

Stakeholders: educational and research institutions, community and civil society

MODULE 3: OIL POLLUTION (SOURCES/ IMPACTS/ METHODS OF INTERVENTION)

- Harmful hydrocarbon /oil derivatives contaminants (sources/ impacts/ etc.)
- Accidents on sea/ Vessels in distress - Types of ship casualties (e.g., capsizing and listing, collision, contact, fire or explosion, hull failure)
- Marine ecosystems' impact (inshore/offshore)
- Type of interventions (inshore/offshore)
- Economic impact of marine pollution – environmental aspects on the Romanian coast/maritime space

Stakeholders: government and regulatory bodies, educational and research institutions, community and civil society

MODULE 4: PHYSIC-CHEMICAL PROPERTIES AND ACCIDENTAL OIL SPILLS' BEHAVIOR

- Oil components (oil type and associated properties)
- Oil propagation and dispersion on sea water masses
- Modeling tools available for general use

Stakeholders: government and regulatory bodies/RNA, educational and research institutions, community and civil society, ports administrators,

MODULE 5: METHODS OF INTERVENTION IN NATIONAL CONTINGENCY PLAN (NATIONAL LEGISLATION AND BS LEGAL FRAMEWORK)

- Type of intervention and equipment used
- Specific intervention on different shores/marine environment - NEBA
- Coastal specificity of the Romanian shore/marine areas

Stakeholders: government and regulatory bodies/RNA, educational and research institutions, community and civil society, ports administratorsetc, all organization responsible designated by law.

MODULE 6: PARTICULARITIES OF SUPERVISED INTERVENTIONS IN THE MARINE DE POLLUTION

- Technologies on intervention, marine env. Factors, efficiency and productivity of different tools
- Techniques in pollution monitoring: Sampling, marine forecast, remote sensing, and in situ measurements
- Analytical methods for detecting pollutants (chromatography, etc.)
- Data analysis and mapping of pollution hotspots
- Case studies on monitoring programs (e.g., UNEP, NOAA, EU Marine Strategy Framework Directive, National, regional) – BS Commission and monitoring programmes and projects with EU and UNEP support
- National monitoring programmes as part of EU MSFD implementation

Stakeholders: government and regulatory bodies, educational and research institutions, community and civil society, ports administrators

MODULE 7: RAPID RESPONSE IN CASE OF EMERGENCY (DUE TO OIL POLLUTION)

- Overview of response strategies (International examples)
- Methods of rapid intervention and minimisation of effects (EWS/NEBA)
- Practicalities of different types of marine pollution – how to act on site (including the various hazards to responders and safety aspects)
- Resources organization for best efficiently for an oil contaminated sites – list of institutions involved by law tools described in National Plans for emergency response to oil pollution in the western Black Sea
- Practices on fully utilizing the resources available on a site effectively
- Monitoring and continuous reporting – overview of new technologies - sampling and analysis tools and techniques (e.g. GIS geographic information systems, remote sensing etc.)
- Assessment of the response plan efficiency
- New technologies for marine pollution response training – the use of Virtual Reality/new monitoring technologies
- Managing the Media - media interactions and ongoing public relations
- Design Training Programs for Civilian Response to Marine Pollution Incidents
- Port reception facilities – in the Danube Delta, transitional and southern sectors of Romanian shore – including trans-boundaries areas with BS countries

Stakeholders: government and regulatory bodies/RNA, educational and research institutions, community and civil society, ports administrators

SECOND PLANNED TRAINING SCHEME FOR DIRECT INVOLVED AUTHORITIES IN OIL POLLUTION EMERGENCY SITUATION, ACADEMIA AND RESEARCH

LONG-TERM TRAINING ON BUILDING INSTITUTIONAL CAPACITY FOR BLACK SEA POLLUTION/LITTER

PREPAREDNESS & RESPONSE

MODULE 1. INTRODUCTION: KEY RESEARCH ISSUES IN MARINE ECOSYSTEM POLLUTION

- Understanding marine pollution: definitions and impacts on ecosystems
- Overview of anthropogenic pollution in the marine environment
- Historical context of pollution and current regional/national trends: MP monitoring

MODULE 2. TYPES, SOURCES, AND IMPACTS OF MARINE POLLUTION: A BLACK SEA BASIN/MFSD IMPLEMENTATION

Perspective

- Identifying Types of Marine Pollution: General Overview and Black Sea Basin Definition of Descriptors

Specific Pollutants:

- Harmful and Toxic Substances (Hydrocarbons, Heavy Metals, Pesticides, Contamination): D8/D9: Contaminants - Sources and Impacts

Biological and Physical Pollution:

- Invasive Species (Ballast Water, etc.): D2 - Sources and Impacts
- Marine Litter: D10 - Sources and Impacts

MODULE 3. ENVIRONMENTAL POLLUTION MONITORING AND ASSESSMENT

Marine Pollution Monitoring Techniques:

- Sampling procedure and measurements procedure for pollution monitoring
- Remote Sensing: Sentinel-2, Sentinel-3 (ESA Copernicus), MODIS, Landsat; Detectable Parameters: Chlorophyll-a (eutrophication indicator), Suspended Particulate Matter (SPM), Sea surface temperature, Oil spills (via synthetic aperture radar - SAR);

- Modeling and Data Integration - DSS/Decision Support Systems (Hydrodynamic models, Oil spill models, Water quality models – EWS/Earl Warning Systems); GIS integration for spatial analysis – Case studies/MP Scenarios

Analytical and Data Processing:

- Analytical Methods for Pollutant Detection (Chromatography, etc.)

Monitoring Programs:

- Case Studies: International (EU MSFD) and National Monitoring Initiatives
- National Monitoring Program under the EU Marine Strategy Framework Directive (its stages of implementation in Romania)

MODULE 4. LEGISLATION AND GOVERNANCE IN THE BSB

- International legal framework vs National legislation – national and regional aspects
- EU Legislation and policy framework (e. g. EU directives: MSFD, etc.)
- Regional agreements: International vs regional vs national/local bodies (involved in monitoring and emergency response and preparedness)
- Other organizations and civil society organizations, involved in marine pollution control & public awareness.

MODULE 5. POLLUTION MANAGEMENT AND MITIGATION

- Pollution prevention strategies for specific types of pollutants (MSFD's POM)
- Remediation and cleanup techniques for specific types of pollutants
- Engineering solutions for specific types of pollutants, including wastewater treatment and plastic waste collection & recycling

MODULE 6. MARINE POLLUTION PREPAREDNESS

- Introduction to National Contingency Plan for emergency response and management of incidents in Romania, regional plans (oil pollution – identification of gaps, issues, funding sources)
- Existing DSS for emergency response in Romania – start and coordination of operations
- Key points, types of pollution to address, Key operational staff role (legal framework: institutional roles and assign responsibilities)
- Overview of equipment – specific intervention technologies, practicalities on different types of marine pollution, preparedness for various hazards/key operational staff and responders for field exercises-training/scenarios analysis

- Assessment on stage of operational staff preparedness – required training, equipment, access to EWS/early warning systems designed as DSS/decision support systems/networking in case of emergency/rapid response, Coastal Community awareness.

MODULE 7. MARINE POLLUTION RESPONSE

- Overview of response strategies (International examples)
- Methods of intervention - NEBA/Environmental Benefit Analysis /process of minimization of impacts
- Monitoring of MP/oil pollution – overview of new monitoring technologies -sampling and analysis tools and techniques (e. g. GIS/GPS drifters, UAVs, EO/remote sensing, modeling, AI, machine learning, etc.)
- Assessment of response plan efficiency in case of Marine Pollution Incidents /New technologies for marine pollution response efficiency – the use of Virtual Reality, EWS/ DSS for data/scenarios analysis, mapping of pollution hotspots according with marine species-Specific cleanup techniques for various marine habitats/ecosystem particularities (NEBA/env case based on a net environmental benefit analysis).

MODULE 8. WESTERN BS MARINE AND COASTAL ECOSYSTEMS IN DISTRESS

- Overview of ecosystems vulnerable to marine pollution
- Ecological impacts of the different marine pollution types (Impact on marine ecosystems and biodiversity, Bioaccumulation and biomagnification)
- Preparedness and Response actions in case of specific ecosystems
- Impacts on human health/socioeconomic impact (Fisheries and aquaculture, Tourism and recreation, Coastal community livelihood)
- Case studies overview – examples from the Black Sea

MODULE 9. INTERVENTION TECHNIQUES IN CASE OF ACCIDENTAL OIL POLLUTION

- Oil spills containment and recovery
- Use of dispersants and booms
- Clean-up operations and cleaning devices
- Bioremediation methods for oil degradation
- New Technologies for oil spill monitoring (EO/Satellite and UAV monitoring)
- Real-time sensors for detecting oil pollution – drifters availability, functioning and providing data for common monitoring platforms.

MODULE 10. EMERGING ISSUES IN MARINE POLLUTION

- Climate change and pollution: Synergies and combined impacts
- Innovations in marine pollution control and green technologies
- Public awareness and the role of citizen science in marine pollution preparedness (MP monitoring and mitigation activities) and rapid response

MODULE 11. DESIGN OF FIELDWORK AND PRACTICAL APPLICATIONS

- Field sampling techniques and in situ data collection
- Lab-based analysis of pollutants
- Emergency services data access
- Development of pollution monitoring and response plans for specific coastal areas (Short range remote sensing techniques vs EO & modelling/EWS)
- Communication and Public Awareness – international and regional case studies
- Engaging professionals vs coastal communities on marine pollution prevention
- Designs questionnaire for public basic awareness on marine pollution

Training course for Ukraine - National plan for training on marine pollution preparedness and emergency response

The National plan for training on marine pollution preparedness and emergency response incorporates stakeholder feedback to ensure relevance of the curricula.

Curriculum Structure and Content: Based on the co-creation outcomes and the project's framework for training (Milestone 6), Ukrainian partners and stakeholders propose the following structure of the training course:

MODULE 1. INTRODUCTION TO THE ISSUES OF RESEARCH INTO POLLUTION OF MARINE ECOSYSTEMS

- Identification of contaminants
- Overview of marine ecosystems and their vulnerability to pollution
- Overview of anthropogenic human impact and pollution on the marine environment
- Historical background on pollution and regional/national trends

MODULE 2. GEOGRAPHY AND CHARACTERISTICS OF THE BLACK SEA, POLLUTION AND ITS IMPACT ON MARINE ECOSYSTEMS

- Overview of marine ecosystems and their vulnerability to pollution
- Geography of the Black Sea, hydrography, unique characteristics, currents
- Black Sea biodiversity and natural resources
- Characteristics of the Black Sea and the connection with pollution

MODULE 3. TYPES AND SOURCES OF POLLUTION, THE IMPACT OF POLLUTION ON THE STATE OF THE ECOSYSTEMS OF THE BLACK SEA BASIN (BSB)

- Sources of marine pollution, their impact on Black Sea ecosystems and the quality of ecosystem services
- Overview of types of marine pollution – general introduction and the most common types of marine pollution, particularly in the BSB
- Eutrophication: sources of occurrence and impact on the state of marine ecosystems
- Oil pollution: sources, risks, impacts, consequences
- Harmful and toxic substances, pollutants (heavy metals, pesticides, radioactive contamination) (sources/impacts/etc.)
- Invasive species - ballast water, other (sources/impacts/etc.)

- Marine litter (sources/impacts/etc.)
- Pollution due to armed conflicts (sources/impacts/consequences, etc.)
- Other types of pollution (e.g., atmospheric precipitation, persistent chemicals, etc.)
- Consequences of marine pollution: ecological, economic, social and other aspects.

MODULE 4. IMPACT OF MARINE POLLUTION ON ECOSYSTEMS AND HUMAN HEALTH

- Environmental impact on marine organisms and ecosystems, features for BSB
- Bioaccumulation and biological increase in pollutant concentrations in marine food chains
- Human health risks associated with seafood contamination and water quality
- Ecosystem services and marine pollution incidents
- Impact on human health
- Socio-economic consequences (fisheries and aquaculture, tourism and recreation, coastal community livelihoods)

MODULE 5: LEGISLATION AND MANAGEMENT SYSTEMS THAT CONTRIBUTE TO COMBATING POLLUTION IN THE BSB

- International legal framework (e.g., MARPOL, London Convention/London Protocol, United Nations Convention on the Law of the Sea (UNCLOS), Basel Convention, International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC), Bunker Convention, etc.) – national and regional specificities of application
- EU legislation and policy framework (e.g., MSFD, WFD, Bathing Water Directive, Port Reception Facilities Directive, Integrated Maritime Policy, etc.), The Common Maritime Agenda (CMA) for the Black Sea
- Regional agreements (e.g., Bucharest Convention, Protocol for the Protection of the Black Sea Environment against Pollution from Land-based Sources, Protocol on Emergency Situations, Protocol on Dumping of Wastes, Black Sea Oil Pollution Contingency Plan under the Protocol on Emergency Situations, Strategic Action Plan for the Protection and Restoration of the Black Sea Environment, Danube River Protection Convention)
- National legislation is the main legal framework for Ukraine in accordance with EU directives
- International bodies (e.g. International Maritime Organization (IMO), European Maritime Safety Agency (EMSA), etc.).
- Regional bodies of the BSB - BSC, BSEC, ICBSS think tank, CPMR in EU through the Balkan and Black Sea Commission (BBSC)

- National/local bodies (e.g. National maritime agencies, other national bodies related to marine pollution – environmental protection agencies, maritime administrations involved in monitoring and responding to emergencies and building preparedness for responding to marine pollution in Ukraine)
- Other organizations and societies involved in marine pollution control (e.g., rescuers, environmental NGOs)

MODULE 6. POLLUTION MONITORING AND ASSESSMENT

- Pollution monitoring methods: sampling, remote sensing and in-situ measurements
- Analytical methods for detecting contaminants (e.g. chromatography, etc.)
- Data analysis and mapping of pollution hotspots
- Case studies of monitoring programmes (e.g., UNEP, NOAA, EU Marine Strategy Framework Directive, national, regional) – BS Commission, monitoring programmes and projects supported by the EU and UNEP
- National monitoring programs as part of the strategic course for the development of the maritime complex of Ukraine, in the context of the EU MSFD

MODULE 7. POLLUTION MANAGEMENT AND MITIGATION

- Pollution prevention strategies and measures
- Methods for restoring and cleaning marine ecosystems
- Engineering solutions for wastewater treatment and coastal pollution control
- Oil spill response technologies and solutions
- Reducing plastic waste: policy, recycling and alternative materials

MODULE 8. PREPAREDNESS TO RESPOND TO MARINE POLLUTION CHALLENGES: OPERATIONAL AND TACTICAL ASPECTS

- Introduction to national emergency response and incident management plans, regional plans (oil pollution, marine litter) – identification of gaps, problems, funding sources
- The existing national emergency response system in the Ukrainian maritime response zone – monitoring, distress signals, initiation and coordination of operations
- Examples of international protocols (e.g., International Convention on Oil Pollution Preparedness, Response and Cooperation (OPRC 90), Protocol on Preparedness, Response and Co-operation to Pollution Incidents by Hazardous and Noxious Substances 2000 (OPRC-HNS Protocol)

- Developing an effective response plan to the challenges of marine pollution - types of pollution, key issues that need to be addressed
- Key operational staff role - Define roles and assign responsibilities
- Review of equipment for responding to marine pollution challenges - definition and organization
- Practical aspects of different types of marine pollution – Preparedness (including different hazards for response services and safety aspects to consider)
- Prepare training sessions for key operational staff and responders – key elements
- Prepare field exercises-training/ scenarios/ use of equipment – national naval exercise, training at sea exercise
- Assessment of operational staff readiness – training, equipment, system support sources

MODULE 9. MARINE POLLUTION RISK ASSESSMENT AND PLANNING OF EARLY WARNING SYSTEMS

- Risk assessment for vulnerable areas – (BS defined by Marpol)
- Contingency planning
- Training and capacity building
- Community raising awareness programs
- Activation of the early warning system
- Practicalities of responding to different types of marine pollution – how to act on site (including the different hazards for response services and safety aspects to consider)
- Methods of intervention in critical situations and minimization of the consequences of marine pollution

MODULE 10. STRATEGIC ASPECTS OF BUILDING PREPAREDNESS TO RESPOND TO THE CHALLENGES OF MARINE POLLUTION

- Overview of strategies for responding to marine pollution challenges (international examples)
- Effective emergency planning (importance, use, key points)
- Strategic planning and organization of the application of effective resources and measures in contaminated areas (e.g., in the case of oil pollution), in accordance with the Black Sea oil pollution emergency response plans at the national level and at the level of the Black Sea Basin countries
- Planning practices for the effective use of material, information and other resources

- Monitoring and reporting – review of new technologies – sampling and analysis tools and methods (e.g., geographic information systems GIS, remote sensing, etc.)
- Waste management and safe disposal
- Assessing the effectiveness of the response plan
- New technologies for preparing for marine pollution response – using virtual reality
- Strategic media engagement management – media engagement and ongoing relationships
- Development of training programs for civilian response to marine pollution incidents
- Port reception facilities – in Ukraine, in other BSB and Danube countries
- Sustainable shipping practices – Marpol, ship reporting, pollutant lists

MODULE 11. MONITORING AND PROSPECTS FOR THE APPLICATION OF NEW TECHNOLOGIES

- Pollution monitoring methods: sampling, remote sensing and in-situ measurements
- Analytical methods for detecting contaminants (e.g. chromatography, etc.)
- Data analysis and mapping of pollution hotspots
- New technologies for monitoring marine pollution (e.g. UAVs, satellite imagery, remote sensing, real-time monitoring, application of AI, including machine learning)
- Citizen engagement – the power of crowdsourcing
- Case studies of monitoring programs (e.g. UNEP, NOAA, EU Marine Strategy Framework Directive, national, regional regulations)
- Scenarios and rules for forming representative samples

MODULE 12. RESPONDING TO MARINE POLLUTION INCIDENTS: WILDLIFE CONSERVATION

- A look at the wildlife most affected by marine pollution incidents (including militarized pollution)
- The impact of different types of marine pollution on wildlife
- Safety protocols for working in wildlife environments affected by marine pollution
- Preparedness to respond to and preserve marine wildlife affected by a marine pollution incident (e.g., oil, chemical, military, etc.)
- Key processes and response protocols used for wildlife affected by a marine pollution incident

- Formation of integrated marine pollution response systems, in accordance with the needs of wildlife. Functional areas of marine incident management
- Key "inputs" required to conserve and support wildlife (e.g., supplies and feed, human resources, equipment, etc.)
- Specific cleaning methods: bacteriological preparations, marine mammals, birds, etc.
- Safety, health and working conditions measures when responding to marine pollution incidents in the context of wildlife conservation

MODULE 13. ECOSYSTEMS AND MARINE POLLUTION INCIDENTS

- Overview of ecosystems vulnerable to marine pollution
- Impact of different types of marine pollution on marine ecosystems
- Preparedness and response actions for specific ecosystems
- Overview of practical examples of responding to pollution of certain ecosystems – examples from the Black Sea

MODULE 14. METHODS FOR MITIGATING THE CONSEQUENCES OF MARINE POLLUTION (USING THE EXAMPLE OF PETROCHEMICAL, MILITARY IMPACT, PLASTIC POLLUTION)

- Oil spill containment and recovery (use of dispersants and booms)
- Mitigating the effects of marine pollution and littering due to military influence
- Plastic and garbage cleanup operations
- Bioremediation methods

MODULE 15. TECHNOLOGICAL INNOVATIONS

- Organization of permanent monitoring and pollution prevention systems. Satellite and unmanned monitoring
- Marine environment cleaning devices
- Green shipping technologies, green ports
- Bioremediation: Using microorganisms to degrade oil.
- Real-time sensors for detecting pollution – availability, functioning and providing data for common platform.

MODULE 16. MODERN CHALLENGES AND RESPONSES TO MARINE POLLUTION

- Climate change and pollution: synergy and combined impact

- Ecological, economic and social challenges of the impact of military conflicts on the Black Sea ecosystem
- Public awareness and the role of science in research and rapid response to pollution

MODULE 17. FIELDWORK AND PRACTICAL APPLICATION OF MARINE POLLUTION RESPONSE

MEASURES

- Field sampling and data collection methods
- Laboratory analysis of pollutants
- Investigation of treatment plants, coastal treatment plants and monitoring stations
- Development of pollution monitoring and response plans in the context of local coastal development
- Peculiarities of conducting research on the marine environment under martial law
- Remote probing/ Remote sensing of the Earth (EO), modeling / etc.

MODULE 18. COMMUNICATION AND PUBLIC RELATIONS. INVOLVEMENT OF THE POPULATION AND VOLUNTEER ORGANIZATIONS TO ELIMINATE THE CONSEQUENCES OF EMERGENCIES IN COASTAL AREAS

- Bringing scientific information to the public
- Volunteers' trainings
- Interaction with communities to prevent marine pollution
- Development of educational materials and campaigns to raise awareness about marine pollution

MODULE 19. RESPONSE TO POLLUTION AND LITTERING CAUSED BY MILITARY ACTIONS

- Military actions, the main requirements for marine pollution response under the martial law
- Actions and restrictions for responding to pollution from military actions
- Key recommendations for the personal safety and marine pollution response under the martial law

SPECIAL SESSIONS

SESSION 1. VESSELS IN DISTRESS

- Types of ship accidents (e.g. capsizing and listing, collision, contact, fire or explosion, hull damage, etc.)
- Impact on ecosystems and biodiversity
- The need for help: the role of places of refuge
- Safe ship recycling
- Examples of selected incidents in the BSB – facts and assessments of tanker wrecks, etc.

SESSION 2. POLLUTION AND LITTERING DUE TO MILITARY AGGRESSION

- Types and extent of pollution and littering of the marine environment as a result of military aggression
- Methods, protocols, measures for preventing and responding to pollution and contamination resulting from military aggression
- Features of practical measurements of impact and calculation of damage to marine ecosystems
- Examples of responses (Kakhovska HPP and others) and practice of using training equipment and simulators

SESSION 3. OIL POLLUTION AND MARINE ACTIVITIES

- Oil Pollution Basics
- Pollution risks during offshore oil and gas production
- National legal framework for oil pollution
- Oil spill response strategies

SESSION 4. BALLAST WATER AND OTHER MARINE POLLUTANTS (INVASIVE SPECIES, ETC.)

- Environmental risks associated with the use of ballast water
- Anti-fouling systems, invasive species and their impact on the environment
- Addressing chemical pollution during maritime operations
- Management of wastewater, garbage and other waste, including disposal methods
- Environmentally friendly methods of ship recycling and utilization

SESSION 5. AIR POLLUTION AND GREENHOUSE GAS EMISSIONS

- Air pollution problems in the shipping industry
- Regulatory and voluntary initiatives to control emissions
- Advanced technologies to reduce emissions of SO_x, NO_x, particulate matter (PM) and other pollutants
- Challenges and opportunities in addressing marine emissions