

Strategic partnership for supporting Blue Growth by enhancing Maritime Higher Education maritime cooperation framework on marine pollution and environment protection field

KA2 - Cooperation for innovation and the exchange of good practices

KA203 - Strategic Partnerships for higher education

Contract no. 2020-1-RO01-KA203-080388

BLUE4SEAS PROJECT

Output No 1 Report

Output Title: “New, innovative and multidisciplinary common curriculum on marine environment protection from pollution”.

1. Output Description:

Environmental protection and climate change issues are important especially in the context of shared sea basins. Water pollution, whether from agricultural activities, industrial or urban discharges are critical problems, exacerbated by risks of marine pollution in regional seas and in the Black Sea. Air pollution is a transboundary issue too in marine areas also due to maritime transport. Dealing with the adverse effects of climate change on the ecosystems, as well as facing sea level rise due to the changing climate are additional considerable challenges. The Black Sea is one of the seas in the world most heavily impacted and polluted by human activities. Environmental issues are equally important on land-borders, particularly in relation to trans-boundary waters (river basins, including groundwater, and lakes), transboundary air pollution (e.g. from industry and the use of solid fuel for domestic heating) and waste management, or shared protected areas.

Main key cross-border challenges related to the pollution of the sea-basin include:

- Eutrophication and nutrient enrichment of inland water
- Change in marine living resources due to a decrease in water quality.
- Chemical pollution in water and air from coastal and shipping activities
- Non-fisheries related mortality factors such as marine pollution
- Environmental protection international cooperation requirements

2. The division of work, the tasks leading to the production of the intellectual output:

All partners actively took part in this work package to collect the relevant data for the preparation of “New, innovative and multidisciplinary common curriculum on marine environment protection from pollution” under the coordination of PRU.

Firstly, 5 subtasks were defined based on the requirements of Output 1.

The subtasks are listed below:

1. What should the common curriculum on marine environment protection from pollution include?
2. Which competencies, skills, and knowledge students are required to have to successfully follow the courses and implement the outcomes?
3. Identifying STCW requirements and seeing if what we decided upon correlates with them.
4. Identifying labor market requirements and seeing how what we have decided can be adapted to the curriculum to meet these requirements.
5. Putting the finishing touches on the list and deciding how they can be incorporated into the curriculum.

Deadlines were determined for the fulfilment each subtask, and 3 meetings were planned to discuss the findings. Thus an “Output 1 Timeline” was created and sent all the partners’ representatives assigned in Output 1.

3. Applied methodology:

For the fulfillment of this particular output, the first thing the working group that was assigned for this output was to determine relevant skills on marine environmental protection in accordance with the IMO and STCW requirements.

Next, a common list of the necessary competencies, skills, and knowledge to be acquired were established, correlated with the needs of the labor market and the requirements of employers, business, decision-makers and other stakeholders for designing the new, innovative and multidisciplinary common curriculum on marine environment protection from pollution.

The steps that were taken are listed below:

1. Discussions on the common curriculum on marine environment protection from pollution
2. Analyses of the necessary competencies, skills, and knowledge
3. Correlation of competencies, skills, and knowledge identified with STCW requirements

4. Adapting competencies, skills, and knowledge to labor market requirements
5. Elaboration of the final list of identified competencies, skills, and knowledge, as a working basis for the common curriculum development.

4. Outcomes:

4.1 After discussions on the common curriculum on marine environment protection from pollution it was decided that the curriculum will have special emphasis on the following topics:

1. Developing healthy marine and coastal ecosystems

- To ensure protection and sustainability of marine ecosystem
- To address marine pollution and plastic litter
- To support sustainable fisheries and aquaculture
- To support innovative marine research infrastructures
- To encourage production, management and sharing of marine and coastal environmental knowledge

2. Raising awareness among public authorities and citizens on marine environmental issues

- Understand the impact of human activities on marine ecosystem,
- Encourage joint projects on marine environmental protection at all educational levels
- Understand the prevention and response to pollution caused by ships and ports
- Develop educational material on marine ecosystem, promoting the practice of marine litter harvesting and recycling,
- Support research on the challenges related to eutrophication, invasive species, emerging pollutants and litter

4.2 Competencies, skills, and knowledge on marine environment protection: A comprehensive survey of tertiary education institutions giving courses relevant to the topic have been made and the outcomes were used to determine the necessary competencies, skills and knowledge for the realization of the project.

- Adaptation to new situations
- Autonomous or teamwork with a presentation
- Basic introductory knowledge for fieldwork planning
- Decision-making

- Introduction to environmental concepts
- Production of free, creative and inductive thinking
- Project planning and management
- Respect for the natural environment
- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Teamwork.
- Work in an interdisciplinary environment.
- Working independently

Future skills with respect to environmental regulations are also reported within the frame of task. A continuous stream of new technologies is being introduced in the shipping industry to ensure that it meets new operational limitations set by environmental regulations. For example, leading shipping companies (Maesk CMA CGM, MSC and Hapag-Lloyd) team up to drive emission reductions faster than regulators. The CO2 reduction targets and new sulphur emission limits are key drivers of these technology developments. As part of regulatory compliance, a number of technologies are likely to be improved - for example, hydrodynamics, new fuel and energy sources, logistics, and methods for effective harbour operations. In addition, systems to reduce emissions and particulate matter in harbours and the proximities to cities will be important. (*[https://www.skillsea.eu/images/Public_deliverables/D1.1.3%20Future%20Skills%20and%20competence%20needs_final%20version\(1\).pdf](https://www.skillsea.eu/images/Public_deliverables/D1.1.3%20Future%20Skills%20and%20competence%20needs_final%20version(1).pdf))

As a consequence of the above changes, the following competences and capabilities will then be needed:

- Logistics and optimisation methods to achieve high utilisation of ships
- Advanced routeing, considering wind, current, and waves
- Operation of complex hybrid and zero emission machineries
- Calculation and documentation of emissions
- Control centres supporting ships with optimisation services, remote control and autonomy
- Performance management systems

4.3. STCW requirements. In addition to the survey based on higher education institutions' requirements, STCW requirements were also taken into consideration while determining the competencies, skills, and knowledge on marine environment protection. That means the following topics were studied:

Competence: 4.3.1. ENSURE COMPLIANCE WITH POLLUTION PREVENTION REQUIREMENTS

MONITOR COMPLIANCE WITH LEGISLATIVE REQUIREMENTS

A. PRECAUTIONS TO BE TAKEN TO PREVENT POLLUTION OF THE MARINE ENVIRONMENT

B. ANTI-POLLUTION PROCEDURES AND ASSOCIATED EQUIPMENT

1. Control of discharge of oil

2. Oil Record Book (Part I – Machinery space operations) and Part II – Cargo/Ballast operations)

3. Shipboard Oil Pollution Emergency Plan (SOPEP) including shipboard Marine Pollution Emergency Plans (SMPEP) for Oil and/or Noxious Liquid substances and Vessel Response Plan (VRP).

4. Operating procedures of anti-pollution equipment, sewage plant, incinerator, comminutor, ballast water treatment plant

5. Volatile Organic Compound (VOC) Management Plan, Garbage Management system, Anti-fouling systems, Ballast Water Management and their discharge criteria

C. PROACTIVE MEASURES TO PROTECT THE MARINE ENVIRONMENT

1. Proactive measures to protect the marine environment

4.4. In accordance with STCW requirements correlated with the needs of the labor market and the requirements of employers, business, decision-makers and other stakeholders the following topics have been decided to take place in the curriculum we are going to prepare.

Marine Pollution and Environment Protection - Awareness

Definition of Marine Pollution, Overview of marine pollution types, Nature of casualties involving ships (capsizing and listing, collision, contact, fire or explosion, hull failure, etc.), Environmental effects, Pollution risks from vessels in distress: the use of places of refuge, Economic losses from marine pollution, International and regional organizations (Local organizations, National maritime agencies, Classification societies, insurance companies and salvors

Maritime Conventions for Marine Pollution

SOLAS, MARPOL, ISM, London Convention and Protocol, BWM, AFS, Hong Kong Convention, OPRC, CLC, FUND, HNS, BUNKER, laws of wreck and salvage, Anti-fouling Systems Convention, Biofouling guidelines, WHO International Health Regulations, guidelines for recycling of ships and inventory of hazardous materials.

Ocean governance & Management

Area-Based Management of the Ocean and Coasts (Spatial management tools such as ocean zoning, marine protected areas, and marine spatial planning), externality, governance and social perceptions, coastal State obligations, sources of pollution and, the science and technologies for pollution monitoring and control. To interpret IMO instruments related to pollution response and to identify the civil liability and compensation regime for marine pollution damage. contingency planning as part of the overall risk management process, Emission control areas (ECAs), Biosecurity

Ecosystem-based approach

Ecosystem functions and marine resources, sustainable ocean governance and responsible ocean business practice, United Nations 2030 Agenda for Sustainable Development, impacts of climate change and the growing human use, mitigating adverse human impacts and restoring ecosystem function.

Air Pollution and Reduction of GHG

Ship emissions (SO_x, NO_x, particulate matter (PM), volatile organic compounds (VOC)), Greenhouse gases (GHG), Limits in the content of marine fuels, Technical and operational measures, Current abatement technology solutions for SO_x, NO_x and PM and other substances (Scrubbers, Biofuels, LNG, Energy Efficiency Design Index (EEDI), Ship Energy Efficiency Management Plan (SEEMP)

Ballast Water Management

Environmental threats from the use of ballast water, IMO response to the problem of invasive species, Ballast Water Management Plan, Ballast Water Exchange and Ballast Water Management Record Book, Compliance, Ballast Water Management Techniques and Technologies

Other Marine Pollutants

Anti-fouling systems, chemical pollution, bilge water/waste oil, ship scrapping and recycling, HNS (Hazardous and Noxious Substances): Noxious Liquid Substances (NLS), Harmful Substances in packaged form, Carriage of dangerous goods, Sewage and garbage and the dumping of other material, including waste management operations, Bilge water/waste oil, Ship scrapping and recycling, Noise, Seabed Damages

Oil Pollution and Offshore Activities

Pollution risks in offshore oil and gas operations, Offshore Pollution Liability Association (OPOL) agreement, Oil Spill response, Clean-up strategies, Crisis and media management,

Pollution preparedness and response

Shipboard monitoring, contingency planning, port reception facilities (IMO, EU and national level), the human element, accident investigation and surveys, intervention and minimisation of effects, Documentation, reporting and communication, International Oil Pollution Prevention Certificate and Oil Record Books, Reporting forms for reception facilities, Contingency planning, Vessel response plans

Legal Issues, Insurance and Compensation

Liability and compensation, non-compliance with international regulations.

4.5 5. The common curriculum drafted in O1 will be consequently detailed in the 4 courses developed in O2. Course on “**Maritime Pollution and Environment Protection - O2 Unit 1**” under PRU responsibility was also devised in accordance with agreed outcomes.

Devised outcomes and course content are common for all modules. In Unit 1, all outcomes have been responded to but in a limited content at 1–2-hour length topics as an introductory course. It is at partners’ discretion whether to apply the same practice to other courses, or else, only selected parts of the content may be addressed in lengthy topics relevant to each course title. Once the topics of the other courses are determined, the whole package will be reviewed to prevent overlaps and likely repetitions. Final tuning will be also necessary during and after the learning material development.

5. Results

The proposed curriculum framework in terms of identified learning outcomes and course content which are based on the detailed review of STCW competencies and main conclusions of the benchmarking study, and which are prepared in accordance with the decisions of the transnational project steering committee meeting is attached as the “IO 1 COURSE GENERAL OUTLINE” in ANNEX 3.

ANNEX:

1. Output 1 Timeline
2. Benchmarking Presentation
3. IO 1 Course General Outline