BRIDGE-BS

LINKING SCIENCE, TECHNOLOGY AND POLICY FOR THE BLUE ECONOMY WITH THE BRIDGE-BS MOOC

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The BRIDGE Black Sea MOOC, “Linking Science, Technology and Policy for the Blue Economy,” was developed within the framework of BRIDGE-BS, an EU-funded multidisciplinary R&I project focused on advancing knowledge, innovation, and sustainable solutions for the Black Sea.

BRIDGE-BS addresses the region’s key environmental challenges and opportunities through advanced marine research, smart observation technologies, ecosystem resilience studies, science policy dialogue, and the Digital Twin Ocean Demonstrator. Building on these activities, the MOOC provides Early Career Ocean Professionals and a broad range of stakeholders with access to scientific foundations, practical approaches, and policy-relevant insights.

Designed as a stepping stone toward future graduate-level education in the region, the course introduces scientific methods and technological tools used to assess and mitigate multiple stressors, strengthen marine ecosystem health, and support the transformation of Blue Economy sectors. As an open-access learning pathway, it contributes to capacity building and supports long-term regional impact.

The course was developed by the BRIDGE-BS Consortium and delivered by the Project Coordinator, METU, Türkiye.

With contributions from the entire BRIDGE-BS Consortium, compiled by the Coordination Team: Ezgi Şahin, Özgün Evrim Sayılkan, and Pınar Uygurer.

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MODULES

MODULE 1: HARMONIZING METHODOLOGIES AND DATA TO ASSESS AND MITIGATE THE EFFECT OF MULTI-STRESSORS

MODULE 2: BLACK SEA DIGITAL TWIN OCEAN DEMONSTRATOR

MODULE 3: RESILIENCE IN MARINE SYSTEMS: CONCEPTS AND PRACTICE

MODULE 4: METHODOLOGIES AND RECOMMENDATIONS FOR ADAPTIVE MANAGEMENT IN THE BLACK SEA

MODULE 5: SMART OBSERVATIONS FOR BOOSTING INNOVATION IN MONITORING AND BLUE GROWTH

MODULE 6: TRANSFORMING BLUE ECONOMY SECTORS TOWARDS SUSTAINABILITY

MODULE 7: BLUE ECONOMY SOLUTIONS

MODULE 8: MARINE SCIENCE COMMUNICATION AND OCEAN LITERACY

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MODULE 1: HARMONIZING METHODOLOGIES AND DATA TO ASSESS AND MITIGATE THE EFFECT OF MULTI-STRESSORS

This module introduces the concept of multi-stressors in the Black Sea, where climate change, pollution, and human pressures interact and increase ecosystem vulnerability. It highlights the importance of harmonised data, standardised monitoring, and integrated assessment approaches to better understand these combined impacts. Drawing on the BRIDGE-BS project and regional initiatives, the module offers practical insights into how data interoperability and open science support evidence-based decision-making.

Presented by Elena Bisinicu
Scientific Researcher at the National Institute for Marine Research and Development “Grigore Antipa” (NIMRD)
Black Sea Young Ambassador

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MODULE 2: BLACK SEA DIGITAL TWIN OCEAN DEMONSTRATOR

This module introduces the Black Sea Digital Twin of the Ocean, a regional virtual system that combines real-time data, coupled physical–biogeochemical models, and AI tools developed under BRIDGE-BS. It explains how modelling, emulators, and application layers, such as resilience, cumulative effects, and socio-economics, enable users to explore future scenarios and management options. The module provides a foundation for understanding how digital ocean technologies support science-based and sustainable decision-making in the Black Sea.

Presented by Barış Salihoğlu
Director of METU Institute of Marine Sciences (METU IMS)
Coordinator of the BRIDGE-BS Project

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MODULE 3: RESILIENCE IN MARINE SYSTEMS: CONCEPTS AND PRACTICE

This module introduces resilience as a key concept for understanding how marine and social-ecological systems maintain their functions and ecosystem services under pressure. It explains how resilience can be assessed using both quantitative, data-intensive approaches and qualitative, expert-based methods when data are limited. Through marine examples, the module highlights how resilience assessments support sustainable resource management and help anticipate tipping points.

Presented by Susa Niiranen
Researcher at Stockholm Resilience Centre - STOCKHOLM UNIVERSITY (SU SRC)
BRIDGE-BS Work Package 3 Lead

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MODULE 4: METHODOLOGIES AND RECOMMENDATIONS FOR ADAPTIVE MANAGEMENT IN THE BLACK SEA

This module explores how human activities at sea can be managed to reduce environmental impacts and enhance the resilience of marine ecosystems. It introduces adaptive management and maritime spatial planning, highlighting the role of decision support tools, AI-based model emulators, and cumulative effects assessment using Black Sea pilot examples. The module also demonstrates how future scenario analysis can inform long-term, science-based decision-making in marine management.

Co-presented by
Stefano Menegon, Senior Researcher at CNR-ISMAR
Philip Smith, DTU Aqua, BRIDGE-BS ECOP
Sofia Bosi, PhD Student at CNR-ISMAR, BRIDGE-BS ECOP
Teodor Musat, Research Assistant at GeoEcoMar

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MODULE 5: SMART OBSERVATIONS FOR BOOSTING INNOVATION IN MONITORING AND BLUE GROWTH

This module introduces smart ocean observations as a shift toward continuous, high-frequency monitoring that supports sustainable and climate-resilient blue economy activities. It highlights how innovative observation technologies enable early warning, data-driven decision support, and digital ocean applications, aligned with Black Sea SRIA and UN Ocean Decade priorities. Drawing on BRIDGE-BS pilot studies, the module showcases how smart observations enhance ecosystem understanding and adaptive marine management in the Black Sea.

Co-presented by
Mustafa Yücel
Deputy Director of METU Institute of Marine Sciences (METU IMS)
Co-coordinator of the BRIDGE-BS Project
Kremena Stefanova
Assoc. Prof. at Institute of Oceanology - BAS
BRIDGE-BS Work Package 5 Co-lead

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MODULE 6: TRANSFORMING BLUE ECONOMY SECTORS TOWARDS SUSTAINABILITY

This module introduces the sustainable blue economy as a pathway toward resilient and inclusive development, emphasising the need for community-driven and locally grounded approaches. It presents the System Innovation Approach as a participatory tool to co-design transformative strategies across blue economy sectors. Using a Black Sea case from the BRIDGE-BS project, the module illustrates how innovation and stakeholder engagement can drive sustainable blue transformations.

Presented by Alice Guittard
Researcher at Athens University of Economics and Business (AUEB)
BRIDGE-BS Work Package 6 Lead

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MODULE 7: BLUE ECONOMY SOLUTIONS

This module explores how human activities at sea can be managed to reduce environmental impacts and enhance the resilience of marine ecosystems. It introduces adaptive management and maritime spatial planning, highlighting the role of decision support tools, AI-based model emulators, and cumulative effects assessment using Black Sea pilot examples. The module also demonstrates how future scenario analysis can inform long-term, science-based decision-making in marine management.

Co-presented by
Frédérick HERPERS and Matteo BOCCI
Stratégies Mer et Littoral (SML)
BRIDGE-BS Work Package 7 Co-lead

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MODULE 8: MARINE SCIENCE COMMUNICATION AND OCEAN LITERACY

This module highlights the importance of marine science communication in making ocean knowledge accessible to society. It introduces ocean literacy principles and practical strategies to effectively share marine science, drawing on BRIDGE-BS communication examples. Through best practices and hands-on tools, the module shows how ocean literacy can inspire public engagement and action for the Black Sea.

Co-presented by
Martha Papathanasiou and Faidra Bazigou, INDIGO-MED
Ayaka Amaha Öztürk, TÜDAV
BRIDGE-BS Work Package 9 Lead and Co-lead

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