DOKUZ EYLÜL UNIVERSITY · SDG PROGRESS REPORT SERIES 2025

SDG 14 — Life Below Water: Progress Report 2025

Subsea Seismology & Marine Geophysics · Underwater Archaeology (Mavi Miras) · Marine Biology & İzmir Bay Monitoring · Subsea Sensor & Antifouling Patents

Dokuz Eylül University, İzmir, Türkiye · Published by the DEU Sustainability Office · Reporting Period: 1 January – 31 December 2025 (with 2025–2026 Longitudinal Evidence)

1. Executive Summary: Marine Science Infrastructure, Subsea Innovation, and Coastal Stewardship

This report documents Dokuz Eylül University's (DEÜ) institutional performance, scientific output, subsea engineering innovations, and regional ecosystem interventions under United Nations Sustainable Development Goal 14 (Life Below Water) for the 2025 reporting cycle, aligned with the Times Higher Education (THE) Impact Rankings and the UI GreenMetric World University Rankings (2025–2026 Sustainability Report). Positioned along the Aegean coast with specialized marine campuses in İnciraltı, Urla, and Seferihisar, DEÜ operates one of the Eastern Mediterranean's most comprehensive academic marine clusters through its Institute of Marine Sciences and Technology (DBTE / IMST), the Maritime Faculty (Denizcilik Fakültesi), the Underwater Cultural Heritage and Maritime History Application and Research Centre (SUDEMER), the Urla Naval Training Center, and the flagship ocean-going research vessel R/V Koca Piri Reis supported by three coastal research vessels.

Key Quantitative Highlights — SDG 14 (2025–2026 Verification Cycle)

• Marine Research & Academic Output: 84 SDG 14 records indexed in the DEÜ AVESİS Academic Data System for 2025–2026 (47 peer-reviewed publications, 8 externally funded research projects, 6 organized scientific conferences/events, 4 conference participations, 3 graduate theses, and 12 core SDG 14 courses), complemented by 39 marine-related sustainability courses across DBTE (22) and the Maritime Faculty (17) and 162 maritime BSc graduates in 2025.
• Subsea Seismology, Marine Geophysics & Underwater Archaeology: Continuous multi-channel seismic (MCS), Chirp sub-bottom, multibeam echosounder (MBES), side-scan sonar (SSS), Ocean Bottom Seismometer (OBS), and ROV surveys aboard R/V Koca Piri Reis mapping the Foça–Karaburun, İzmir Bay, Gülbahçe, and North Aegean active fault zones; alongside the Presidency of Strategy and Budget (SBB)-funded Turkish Shipwreck Inventory Project: Blue Heritage (Mavi Miras / TUBEP) documenting Ottoman, Venetian, and ancient shipwrecks.
• Marine Biology, İzmir Bay Recovery & Subsea Patents: Completion of the İZKA & İZSU İzmir Bay Ecosystem-Based Management Decision-Support Platform (June 2025 – January 2026), dissolved oxygen and plankton bloom monitoring across Inner/Middle/Outer İzmir Bay (May 2025 İzmir Bay Oxygen Recovery Measurements), patent clusters in subsea sensors and antifouling fishing-net capsules, and establishment of the DEPARK spinoff SmartOceanics Marine Technologies Inc. (August/September 2025).



Figure 1: DEÜ Institute of Marine Sciences and Technology (DBTE / IMST) at İnciraltı Campus (left, 27,666 m² land area and 6,400 m² research facility adjacent to Çakalburnu Lagoon) and the Coastal Student Training and Recreation Campus in Seferihisar (right) (Source: DEÜ Sustainability Report 2025–2026, p. 9).

2. Institutional Commitment, Marine Governance, and Coastal Campus Infrastructure

Dokuz Eylül University governs its marine, coastal, and watershed impacts through an integrated regulatory architecture anchored by the DEÜ Sustainability Office (Green Campus Coordination), the Social Contribution Coordination Office (Toplumsal Katkı Koordinatörlüğü), and the Department of Construction and Technical Works (Yapı İşleri ve Teknik Daire Başkanlığı). All unit plans, environmental indicators, and community outreach outputs are tracked digitally through the KİM (Kurumsal İzleme Merkezi / Institutional Monitoring System) under the supervision of the University Quality Commission.

Governance Instrument / Marine Infrastructure	Jurisdiction & Physical Scope	THE SDG 14 Alignment	Accountable Unit & Verification Source
Institute of Marine Sciences and Technology (DBTE / IMST)	İnciraltı Campus: 27,666 m² land area, 6,400 m² building area; 3 academic divisions (Marine Sciences, Marine Technology, Living Marine Resources); 4 research vessels led by R/V Koca Piri Reis.	14.1, 14.2, 14.3, 14.5	DBTE Directorate (imst.deu.edu.tr)
Maritime Faculty & Urla Naval Training Center	Central Campus (Maritime Faculty) & Urla Coastal Facility (8,840 m² land, 4,685 m² building area); bridge/engine simulators, sea survival & ballast-water management labs.	14.2, 14.3.1, 14.3.4, 14.5.3	Maritime Faculty (denizcilik.deu.edu.tr)
Underwater Cultural Heritage & Maritime History Centre (SUDEMER)	National shipwreck inventory (Mavi Miras / TUBEP), scientific diving unit, side-scan sonar & underwater photogrammetry archive.	14.1, 14.3.1, 14.5.4	SUDEMER Directorate (sudem.deu.edu.tr)
Integrated Management System Policy (ISO 14001) & Zero-Waste Directive	100% municipal sewer connection to İZSU advanced biological treatment; 15 Zero-Waste certified campuses (renewed to 2031); closed grit chambers & grease interceptors.	14.4.1, 14.4.2, 14.4.3	Sustainability Office (greencampus.deu.edu.tr)
Nutrition Services Operating Directive (Senate Decision No. 633/05)	Mandatory legal size limits, seasonal fishing-ban compliance (Fisheries Law No. 1380), and veterinary traceability (Law No. 5996) across all campus dining halls.	14.3.2	SKS Department (sks.deu.edu.tr)
Sponge-Campus Watershed & Permeable Surface Strategy	3,111,315 m² (56.2%) forest cover and 1,384,477 m² (25.0%) water-absorption area across 5,532,681.53 m² total campus land, preventing stormwater sediment/pollutant runoff into İzmir Bay.	14.5.1, 14.5.5	Construction & Technical Works (yapiisleri.deu.edu.tr)



Figure 2: Rooftop Solar Photovoltaic Arrays Installed on the Institute of Marine Sciences and Technology (DBTE / IMST) Buildings at İnciraltı Campus, Decarbonising Marine Laboratory Operations (Source: DEÜ Sustainability Report 2025–2026, p. 43).

3. Quantitative Progress Across SDG 14 Indicators (2024–2026)

Table 2 synthesizes DEÜ's verified institutional metrics across marine research, maritime education, coastal ecosystem monitoring, wastewater pre-treatment, and plastic/hazardous waste prevention for the 2024–2026 reporting cycle.

Metric / Performance Dimension	2024 Baseline / Prior Cycle	2025–2026 Verified Value	Primary Institutional Data Source
SDG 14 Tagged Academic Records in AVESİS	Baseline SDG tagging launched	84 records (47 publications, 8 projects, 6 events, 4 conf., 3 theses, 12 courses)	DEÜ AVESİS SDG 14 Filter (2025–2026)
Marine & Maritime Sustainability Courses	35 courses across DBTE & Maritime Faculty	39 courses (22 at DBTE / IMST; 17 at Maritime Faculty) out of 937 DEÜ sustainability courses	Sustainability Report 2025–2026, pp. 114–115
Maritime Faculty BSc Graduates (2025)	154 BSc graduates	162 BSc graduates (100 Maritime Transportation & Mgmt. Eng.; 62 Maritime Business Admin.)	2025 Administrative Activity Report
Oceanographic & Seismic Research Fleet	R/V Koca Piri Reis + 3 coastal vessels	4 vessels active + 2025 SBB Infrastructure Strengthening Project & North Aegean cruises	IMST Announcements & Fleet Cruises
Underwater Cultural Heritage Shipwreck Inventory (Mavi Miras)	2024 Aegean & Mediterranean dive campaigns	2025 sea campaigns completed; Kızlan Ottoman, Rhodes, and Venetian shipwrecks documented	DEÜ News & TINA Maritime Archaeology
İzmir Bay Ecosystem Decision-Support Platform	Protocol preparation & station design	Completed (June 2025 – January 2026) with İZKA & İZSU; dissolved oxygen recovery verified (May 2025)	İZSU & DEÜ Joint Platform Announcement

Metric / Performance Dimension	2024 Baseline / Prior Cycle	2025–2026 Verified Value	Primary Institutional Data Source
Marine Technology Spinoffs & Subsea Patents	Subsea sensor & antifouling net R&D	SmartOceanics Marine Technologies Inc. founded (Aug/Sep 2025); 2 core SDG 14 patent clusters mapped	Sustainability Report 2025–2026, pp. 145–146
Plastic Waste Diverted from Marine/Landfill Pathways	89.5 tonnes plastic waste (2024)	60.0 tonnes in 2024–2025 (−33.0% reduction); 66.5 tonnes tracked in 2025–2026 via 3 DOA RVMs & 15 Zero-Waste campuses	Sustainability Report 2025–2026, pp. 62–69
Waste Vegetable Oil & Hazardous Waste Prevented from Entering Drains	4.8 t waste oil; 52.3 t hazardous waste	5.1 tonnes waste cooking oil converted to biodiesel; 44.1 t chemical/hazardous waste & 886.9 t medical waste tracked via MOTAT/EÇBS	Sustainability Report 2025–2026, pp. 74–78
Community Outreach in Environment & Sustainability	98 public outreach events	125 activities delivered by 33 DEÜ units in 2025 (including DEÜSAT seafloor clean-up with 45 divers on 14–15 June 2025)	2025 Social Contribution Activity Report

4. Subsea Earthquake Studies, Marine Seismology, and Underwater Geophysics (DBTE & SeisLab)

The Aegean Sea and Western Anatolia constitute one of the most seismically active extensional-transtensional basins on Earth, where submarine fault ruptures pose compounded earthquake, submarine landslide, and tsunami hazards to coastal metropolitan areas such as İzmir. Following the destructive 30 October 2020 Samos (Sisam)–İzmir earthquake (Mw 6.6–6.9) and the 2025 Santorini–Amorgos–Aegean seismic swarms, DEÜ's Department of Marine Geology and Geophysics at the Institute of Marine Sciences and Technology (DBTE) and its Marine Seismology and Geophysics Laboratory (SeisLab) have expanded high-resolution submarine fault mapping and marine geophysics campaigns across the Aegean continental shelf.

- **R/V Koca Piri Reis Multidisciplinary Marine Geophysics Platform:** Commissioned as Türkiye's first dedicated multidisciplinary scientific research vessel (R/V Koca Piri Reis Technical Specifications), the 36.0 m long, 8.10 m beam, 300-gross-ton vessel operates with a 15–20 day continuous offshore endurance without port resupply. The vessel is equipped for 2D/3D Multi-Channel Seismic (MCS) reflection profiling, high-resolution shallow sub-bottom Chirp/Boomer acoustics, Multibeam Echosounder (MBES) swath bathymetry, Side-Scan Sonar (SSS) seafloor mosaic imaging, magnetometry, gravity coring, Ocean Bottom Seismometer (OBS) deployment, and Remotely

Operated Vehicle (ROV) visual inspection (DEÜ Marine Geophysics and Sonar Training aboard R/V Koca Piri Reis).

- **Active Tectonics of the Foça–Karaburun Coast, İzmir Bay, and North Aegean Fault Zones:** Identified as one of DEÜ's flagship thematic research clusters in the 2025–2026 Sustainability Report (p. 146), the Active Tectonics of the Foça–Karaburun Coast & Aegean Seismic Research Programme maps submarine strike-slip and normal fault segments across the Karaburun Ridge, the Foça Depression, the Gülbahçe Fault Zone, the Tuzla and Seferihisar offshore fault continuations, and the North Aegean Trough. Seismic reflection profiles quantify Holocene sediment offset, submarine canyon slope stability, and tsunami-generating seafloor deformation.
- **Submarine Gas Hydrates, Cold Seeps, and Subsea Pipeline Engineering Geohazards:** DBTE marine geophysicists conduct acoustic anomaly detection for shallow biogenic/thermogenic gas accumulations, pockmarks, mud volcanoes, and gas hydrates across the Aegean, Marmara, Black Sea, and Eastern Mediterranean basins, while providing pre-lay seabed hazard assessments for submarine telecommunications cables, offshore wind foundations, and subsea energy pipelines.
- **EMODNET (European Marine Observation and Data Network) Integration:** DEÜ's marine geology and bathymetric datasets are harmonized with the European Marine Observation and Data Network (EMODNET) standards (Sustainability Report 2025–2026, p. 146), ensuring international interoperability of Aegean seabed substrate, bathymetry, and active fault data.

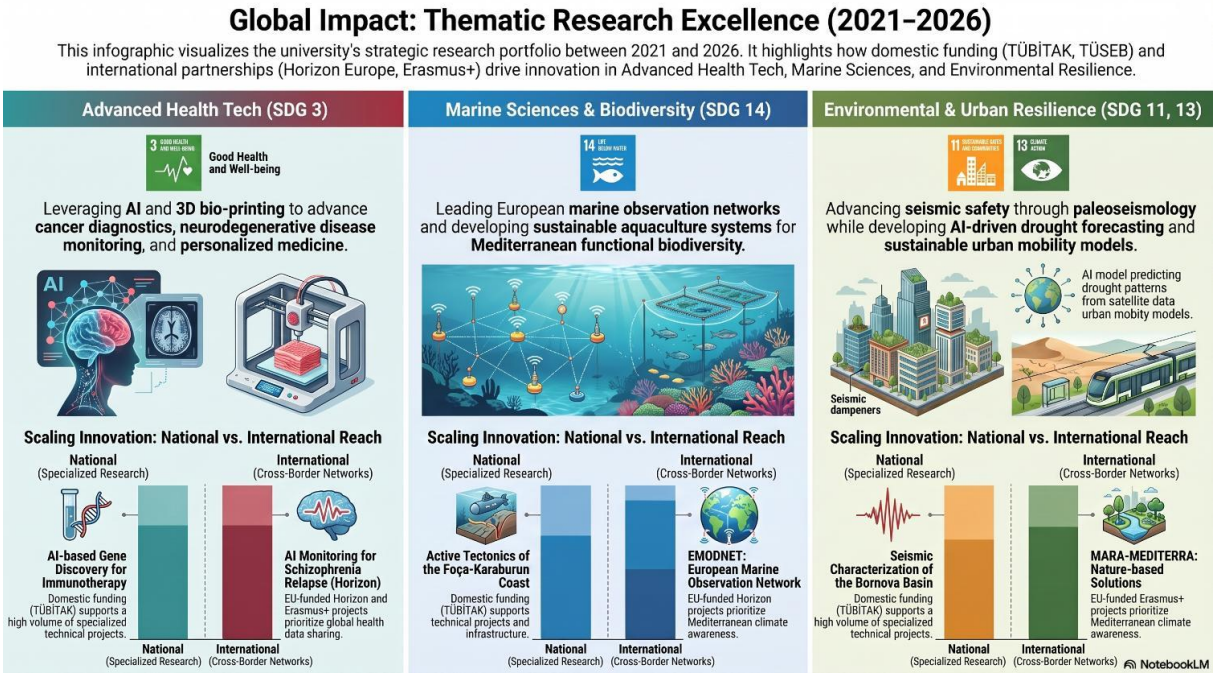


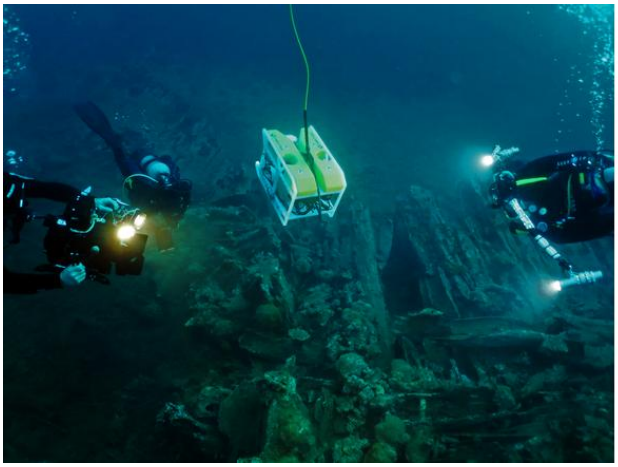
Figure 3: Global Impact — Thematic Research Excellence (2021–2026): Column 2 Highlights DEÜ's Marine Sciences & Biodiversity (SDG 14) Cluster, Including Active Tectonics of the Foça–Karaburun Coast, EMODNET Integration, and Sustainable Mediterranean Aquaculture Systems (Source: DEÜ Sustainability Report 2025–2026, p. 146).

5. Underwater Archaeology and Subsea Cultural Heritage: The 'Blue Heritage (Mavi Miras)' Programme

Through the Underwater Cultural Heritage and Maritime History Application and Research Centre (SUDEMER) and the DBTE Master of Science programme in Underwater Archaeology (Sualtı Kültür Mirası / Sualtı Arkeolojisi), led by Prof. Dr. Abdurrahman Harun Özdaş and Assoc. Prof. Nilhan Kızıldağ, Dokuz Eylül University directs Türkiye's flagship national subsea archaeological inventory.

- **Turkish Shipwreck Inventory Project — Blue Heritage (Mavi Miras / TUBEP):** Supported by the Presidency of Strategy and Budget (SBB) and executed in partnership with the Ministry of Culture and Tourism, Blue Heritage (Mavi Miras) completed extensive offshore acoustic and diving campaigns in 2024 and 2025 (Mavi Miras Research Campaigns Completed). Coupling deep-towed Side-Scan Sonar (SSS), multibeam bathymetry, ROV inspection, and technical saturation/mixed-gas diving, the project has catalogued hundreds of shipwrecks, submerged prehistoric/antique settlements, and ancient anchorages from the Bronze Age to the Ottoman and Republican eras into a national Geographic Information System (GIS) database (DEÜ Reveals Underwater Cultural Heritage).
- **Kızlan Ottoman Shipwreck, Rhodes (Rodos) Shipwreck & Venetian Naval Wrecks:** Recent field seasons and peer-reviewed monographs published in TINA Maritime Archaeology Periodical (Issue 22, January 2025) documented the Kızlan Ottoman Shipwreck (yielding Ottoman ceramics, wooden artefacts, and maritime artillery), the Rhodes (Rodos) Amphora Shipwreck, and the 17th-century Venetian warships Stella Maris and Leon Coronato off Eğriliman (İzmir coast).
- **Acoustic Mapping of the 1770 Çeşme and 1853 Sinop Naval Battlefields:** Using high-frequency side-scan sonar and marine magnetometry, DEÜ underwater archaeologists mapped the submerged battlefields of the 1770 Battle of Çeşme (İzmir) and the 1853 Battle of Sinop, establishing non-invasive conservation zones that protect both historic hull remains and the artificial-reef benthic ecosystems that have colonized the wrecks (TINA Issue 22 — Çeşme & Sinop Sonar Mapping).
- **Public Exhibitions on Maritime Memory ('Blue Heritage' & TEOS 'Water and Memory'):** To translate subsea science into public stewardship, SUDEMER curated the 58-photograph Mavi Miras Underwater Archaeology Exhibition (under the auspices of the Ministry of Culture and Tourism and the Ministry of Foreign Affairs) and partnered with the TEOS Culture and Art Association in 2025 for the interdisciplinary exhibition on Water and Memory in Seferihisar/Sığacık.





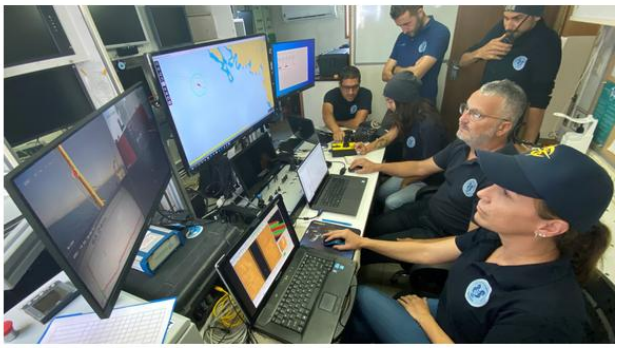


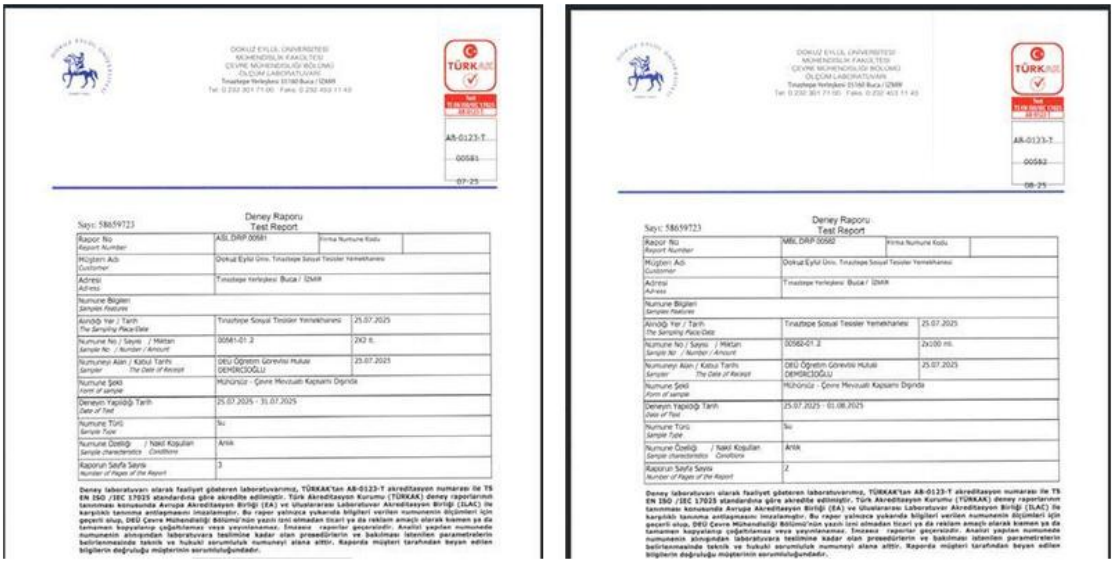
Figure 4. Scientific diving and shipboard survey operations in DEÜ's Blue Heritage research archive. Left: divers work alongside a remotely operated underwater vehicle above submerged remains. Right: researchers operate the shipboard survey and navigation consoles. The photographs illustrate the complementary field methods used to investigate underwater cultural heritage. Source: the official SUDEMER visual archive; the individual photographs carry no stated campaign date.

Sources: SUDEMER official archive | Underwater survey photograph | Shipboard control room

6. Marine Biology, Living Marine Resources, and İzmir Bay Ecosystem Recovery Studies

İzmir Bay—divided hydrographically into Inner, Middle, and Outer Bay basins—serves as DEÜ's primary natural laboratory for marine biology, chemical oceanography, eutrophication control, and coastal biodiversity conservation. Following decades of continuous monitoring since the commissioning of the Grand Canal Project in 2000 (İzmir Metropolitan Municipality & DEÜ 15-Year İzmir Bay Recovery Assessment), DBTE marine biologists and oceanographers played a leading scientific role during the 2024–2026 ecological cycle.

- **İZKA & İZSU İzmir Bay Ecosystem-Based Management and Decision-Support Platform (June 2025 – January 2026):** In June 2025, DEÜ DBTE signed a strategic scientific protocol with the İzmir Water and Sewerage Administration (İZSU) and the İzmir Development Agency (İZKA) to build the İzmir Bay Ecosystem-Based Management and Decision-Support Platform (completed in January 2026). The platform integrates hydrodynamic circulation models, nutrient-load mass balances (nitrogen, phosphorus, silicate), benthic-pelagic coupling, and real-time physicochemical sensor feeds to guide municipal dredging, stormwater separation, and advanced wastewater treatment upgrades.
- **Dissolved Oxygen Recovery, Harmful Algal Blooms (Red-Tide), and Fish-Mortality Diagnostics in İzmir Bay:** Following the acute August 2024 dinoflagellate/microalgae bloom, thermal stratification, and hypoxia event that triggered localized fish mortalities in the Inner Bay (DEÜ DBTE Prof. Dr. Doğan Yaşar Analysis of İzmir Bay Pollution Accumulation), DBTE researchers led by Prof. Dr. Esin Suzer conducted monthly biogeochemical cruises from December 2024 through May 2025 (NTV Report on İzmir Bay Oxygen Recovery, May 2025). Water-column profiles across Inner, Middle, and Outer Bay stations (IZMSW1, IZMSW2, and reference transects under the Ministry's DEN-İZ Integrated Marine Pollution Monitoring Programme) confirmed a significant rebound in dissolved oxygen concentrations and water transparency in spring 2025.
- **Çakalburnu Lagoon Stewardship, Posidonia oceanica Meadows, and Mediterranean Functional Biodiversity:** Located immediately adjacent to DBTE's İnciraltı Campus, the Çakalburnu Lagoon (Çakalburnu Dalyanı) is monitored continuously by the Living Marine Resources Division for benthic macroinvertebrates, juvenile fish recruitment, water exchange, and migratory waterbirds (flamingos, pelicans, cormorants). In parallel, DBTE's Sustainable Aquaculture Systems for Mediterranean Functional Biodiversity cluster (Sustainability Report 2025–2026, p. 146) maps endemic Posidonia oceanica seagrass beds (critical blue-carbon sinks), tracks invasive Lessepsian species (such as pufferfish Lagocephalus sceleratus and lionfish Pterois miles), and models carrying capacities for offshore Aegean finfish aquaculture.
- **Circular Bio-Economy Valorisation of Marine Macroalgae (TÜBİTAK 2209-A Project):** Bridging marine biology and circular design, a 2025–2026 TÜBİTAK 2209-A Research Project harvests drifted/excess marine macroalgae (seaweed biomass) from Aegean shorelines and converts them into biodegradable bio-composite polymers for sustainable fashion accessories, converting eutrophication biomass into high-value circular materials.



Deney Raporu
Test Report

Sayı: 58659723

Rapor No *Report Number*	ASL.DRP.00581	Firma Numune Kodu	
Müşteri Adı *Customer*	Dokuz Eylül Üniv. Tınaztepe Sosyal Tesisler Yemekhanesi		
Adresi *Adress*	Tınaztepe Yerleşkesi Buca / İZMİR		
Numune Bilgileri *Samples Features*			
Alındığı Yer / Tarih *The Sampling Place/Date*	Tınaztepe Sosyal Tesisler Yemekhanesi	25.07.2025	
Numune No / Sayısı / Miktarı *Sample No. / Number / Amount*	00581-01.2	2X2 lt.	
Numuneyi Alan / Kabul Tarihi *Sampler / The Date of Receipt*	DEÜ Öğretim Görevlisi Mutlu DEMİRCİOĞLU	25.07.2025	
Numune Şekli *Form of sample*	Mühürsüz - Çevre Mevzuatı Kapsamı Dışında		
Deneyin Yapıldığı Tarih *Date of Test*	25.07.2025 - 31.07.2025		
Numune Türü *Sample Type*	Su		
Numune Özelliği / Nakil Koşulları *Sample characteristics / Conditions*	Arıtık		
Raporun Sayfa Sayısı *Number of Pages of the Report*	3		

Deney laboratuvarı olarak faaliyet gösteren laboratuvarımız, TÜRKAK'tan AB-0123-T akreditasyon numarası ile TS EN ISO /IEC 17025 standardına göre akredite edilmiştir. Türk Akreditasyon Kurumu (TÜRKAK) deney raporlarının tanınması konusunda Avrupa Akreditasyon Birliği (EA) ve Uluslararası Laboratuvar Akreditasyon Birliği (ILAC) ile karşılıklı tanınma anlaşmasını imzalamıştır. Bu rapor yalnızca yukarıda bilgileri verilen numunenin ölçümleri için geçerli olup, DEÜ Çevre Mühendisliği Bölümü'nün yazılı izni olmadan ticari ya da reklam amaçlı olarak kısmen ya da tamamen kopyalanıp çoğaltılamaz veya yayınlanamaz. İmzasız raporlar geçersizdir. Analizi yapılan numunede numunenin alınışından laboratuvara teslimine kadar olan prosedürlerin ve bakılması istenilen parametrelerin belirlenmesinde teknik ve hukuki sorumluluk numuneyi alana aittir. Raporda müşteri tarafından beyan edilen bilgilerin doğruluğu müşterinin sorumluluğundadır.

Deney Raporu
Test Report

Sayı: 58659723

Rapor No *Report Number*	MBL.DRP.00582	Firma Numune Kodu	
Müşteri Adı *Customer*	Dokuz Eylül Üniv. Tınaztepe Sosyal Tesisler Yemekhanesi		
Adresi *Adress*	Tınaztepe Yerleşkesi Buca / İZMİR		
Numune Bilgileri *Samples Features*			
Alındığı Yer / Tarih *The Sampling Place/Date*	Tınaztepe Sosyal Tesisler Yemekhanesi	25.07.2025	
Numune No / Sayısı / Miktarı *Sample No. / Number / Amount*	00582-01.2	2x100 ml.	
Numuneyi Alan / Kabul Tarihi *Sampler / The Date of Receipt*	DEÜ Öğretim Görevlisi Mutlu DEMİRCİOĞLU	25.07.2025	
Numune Şekli *Form of sample*	Mühürsüz - Çevre Mevzuatı Kapsamı Dışında		
Deneyin Yapıldığı Tarih *Date of Test*	25.07.2025 - 01.08.2025		
Numune Türü *Sample Type*	Su		
Numune Özelliği / Nakil Koşulları *Sample characteristics / Conditions*	Arıtık		
Raporun Sayfa Sayısı *Number of Pages of the Report*	2		

Deney laboratuvarı olarak faaliyet gösteren laboratuvarımız, TÜRKAK'tan AB-0123-T akreditasyon numarası ile TS EN ISO /IEC 17025 standardına göre akredite edilmiştir. Türk Akreditasyon Kurumu (TÜRKAK) deney raporlarının tanınması konusunda Avrupa Akreditasyon Birliği (EA) ve Uluslararası Laboratuvar Akreditasyon Birliği (ILAC) ile karşılıklı tanınma anlaşmasını imzalamıştır. Bu rapor yalnızca yukarıda bilgileri verilen numunenin ölçümleri için geçerli olup, DEÜ Çevre Mühendisliği Bölümü'nün yazılı izni olmadan ticari ya da reklam amaçlı olarak kısmen ya da tamamen kopyalanıp çoğaltılamaz veya yayınlanamaz. İmzasız raporlar geçersizdir. Analizi yapılan numunede numunenin alınışından laboratuvara teslimine kadar olan prosedürlerin ve bakılması istenilen parametrelerin belirlenmesinde teknik ve hukuki sorumluluk numuneyi alana aittir. Raporda müşteri tarafından beyan edilen bilgilerin doğruluğu müşterinin sorumluluğundadır.

Figure 5: Chemical, Spectrophotometric, and Microbiological Water Quality Analyses Conducted by the DEÜ Department of Environmental Engineering Laboratories to Monitor Campus and Coastal Water Quality (Source: DEÜ Sustainability Report 2025–2026, p. 87).

7. Developed Subsea Equipment, Marine Engineering Patents, Spinoffs, and Flagship Projects

A distinguishing feature of DEÜ's SDG 14 portfolio is its indigenous hardware engineering: developing patented subsea sensors, eco-friendly aquaculture materials, zero-emission marine vessels, and deep-tech academic spinoffs through the DEPARK Technopark and the DEÜ Technology Transfer Office (DETTO).

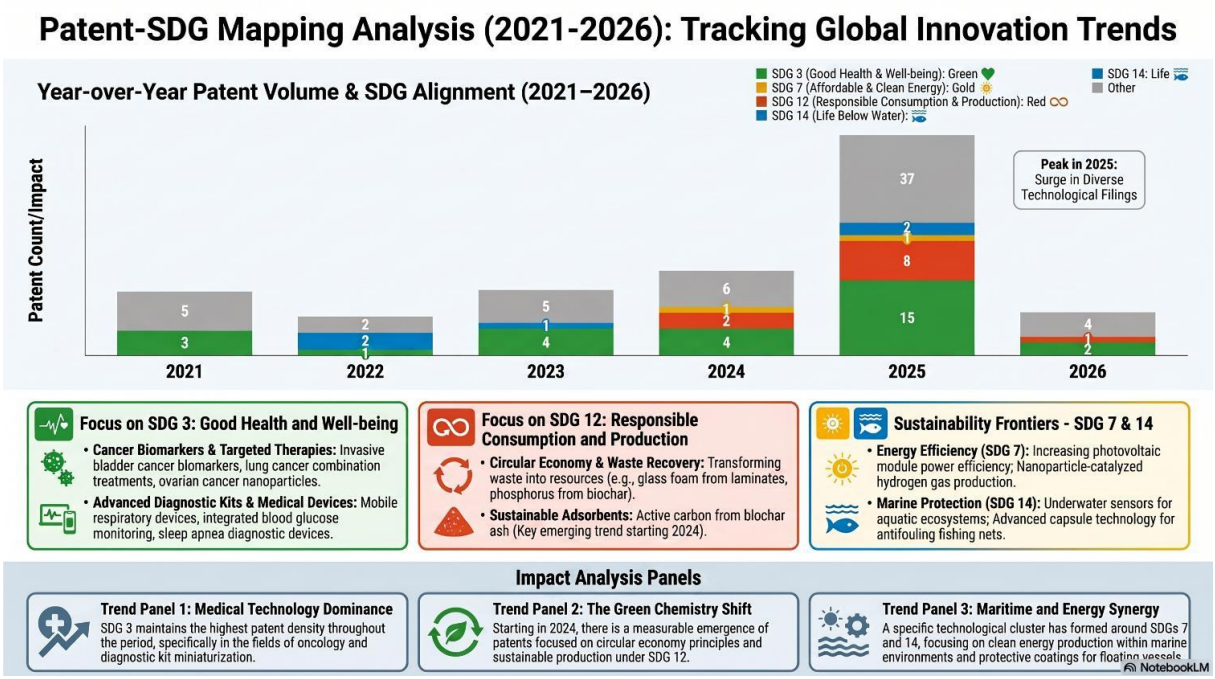


Figure 6: DEÜ Patent–SDG Mapping Analysis (2021–2026): Panel 3 ('Sustainability Frontiers: SDG 7 & 14') Documents DEÜ's Dedicated SDG 14 Patent Cluster in 'Underwater Sensors for Aquatic Ecosystems' and 'Advanced Capsule Technology for Antifouling Fishing Nets' (Source: DEÜ Sustainability Report 2025–2026, p. 145).

Technology / Patent / Project / Spinoff	Technical Mechanism & Developed Equipment	Marine Ecosystem Impact (THE SDG 14 Metric)	Lead Unit / Funding & Status (2025–2026)
Patent Cluster 1: Underwater Sensors for Aquatic Ecosystems	Indigenous subsea acoustic, optical, and multi-parameter physicochemical sensor assemblies engineered for high-salinity Aegean pressure regimes and real-time telemetry buoys.	Enables continuous, low-cost in-situ monitoring of dissolved oxygen, turbidity, temperature, and acoustic signatures without foreign hardware dependency (14.1, 14.3.4, 14.5.2).	DETTO / DBTE Patent Portfolio (SR 2025–2026, p. 145)

Technology / Patent / Project / Spinoff	Technical Mechanism & Developed Equipment	Marine Ecosystem Impact (THE SDG 14 Metric)	Lead Unit / Funding & Status (2025–2026)
Patent Cluster 2: Advanced Capsule Technology for Antifouling Fishing Nets	Controlled-release polymeric micro/macro-capsule system integrated into aquaculture cage nets and artisanal fishing gear to inhibit biofouling (barnacles, algae, hydroids).	Eliminates toxic cuprous oxide (Cu2O) and biocide leaching from traditional antifouling paints into coastal sediments and farmed fish tissues (14.2.2, 14.3.4, 14.4.3).	DETTO / DBTE & Engineering Patent Cluster (SR 2025–2026, p. 145)
DEPARK Spinoff: SmartOceanics Marine Technologies Inc.	Academic spinoff company founded in August/September 2025 at DEPARK developing autonomous marine monitoring hardware, subsea acoustic/iot systems, and smart oceanographic instruments.	Commercializes university subsea sensor R&D into deployable industrial equipment for ports, aquaculture farms, and coastal municipalities (14.1, 14.3.4).	DEPARK TGB-1 Spinoff (SR 2025–2026, p. 149)
SBB Marine Science Research Infrastructure Project (2025–)	Multi-year capital investment grant from the Presidency of Strategy and Budget (SBB) upgrading R/V Koca Piri Reis sonar/seismic arrays, oceanographic winches, and DBTE analytical labs.	Expands national deep-sea and continental-shelf monitoring capacity across the Aegean and Eastern Mediterranean (14.1, 14.5.2).	Presidency of Strategy & Budget (SBB) / DBTE (2025–)
DİYYOJEN Solar Boat Team (Güneş Enerjili Tekne)	Student-faculty multidisciplinary naval architecture team designing carbon-composite hull, high-efficiency solar PV deck arrays, and brushless electric propulsion.	Demonstrates zero-emission, zero-bilge-discharge, low-underwater-noise coastal vessel propulsion (14.3.4, 14.5.3).	DBTE Naval Architecture & Engineering Faculty
Underwater Welding & Subsea Structural Repair Technologies	Graduate research in DBTE Naval Architecture Department on wet/hyperbaric underwater welding electrodes, corrosion protection, and offshore structural integrity.	Prevents subsea pipeline/hull structural failure and hydrocarbon leaks in marine environments (14.3.4, 14.5.1).	AVESİS Naval Architecture Thesis & Lab Archive

8. Teaching, Graduate Marine Curricula, and Aquatic Ecosystem Outreach (THE 14.2)

Education for aquatic ecosystem stewardship spans formal degree programmes at DBTE and the Maritime Faculty alongside structured training for fishers, coastal municipalities, school students, and the wider public.

- **Graduate Degree Programmes at the Institute of Marine Sciences and Technology (DBTE / IMST):** Offering 22 dedicated sustainability courses, DBTE (imst.deu.edu.tr) delivers specialized MSc and PhD degrees across seven interdisciplinary tracks: (1) Living Marine Resources (MSc & PhD) covering stock assessment, overfishing prevention, and marine biodiversity; (2) Marine Geology and Geophysics (MSc & PhD) covering marine seismology and seabed tectonics; (3) Marine Chemistry / Physical Oceanography (MSc & PhD) covering marine pollution and biogeochemical cycles; (4) Underwater Archaeology / Cultural Heritage (MSc); (5) Naval Architecture (MSc); (6) Coastal Engineering (MSc & PhD); and (7) Coastal Zone Management (MSc).
- **Undergraduate & Graduate Programmes at the Maritime Faculty (Denizcilik Fakültesi):** Offering 17 dedicated sustainability courses, the Maritime Faculty (denizcilik.deu.edu.tr) graduated 162 BSc engineers and managers in 2025 across Maritime Transportation and Management Engineering (100 graduates) and Maritime Business Administration (62 graduates), alongside MSc and PhD degrees in Maritime Safety, Security and Environmental Management (incorporating MARPOL Annex I–VI, IMO Ballast Water Management Convention, green port management, and oil-spill response).
- **Community Education on Freshwater Watersheds, Sustainable Fisheries & Overfishing (THE 14.2.1, 14.2.2, 14.2.3):** In 2025, 33 university units delivered 125 public social contribution activities in the 'Environment and Sustainability' thematic area (2025 Social Contribution Activity Report). These included technical extension seminars for Aegean small-scale artisanal fishers and aquaculture cooperatives on selective fishing gear, minimum landing sizes, seasonal spawning closures, and ghost-net recovery, as well as freshwater watershed conservation outreach across the Küçük Menderes and Tahtalı Dam basins.
- **Sustainable Seafood Procurement Policy in Campus Dining Halls (THE 14.3.2):** Under the DEÜ Nutrition Services Operating Directive (Senate Decision No. 633/05) and Sustainable Procurement Guidelines, all fish and seafood procured for campus dining halls (~15,000 daily meals) must comply with Turkish Fisheries Law No. 1380 minimum legal catch sizes, seasonal prohibitions, and Law No. 5996 cold-chain and origin traceability.

9. National & International Marine Conferences, Partnerships, and Seafloor Stewardship (THE 14.3 & 14.5)

DEÜ acts as a national convener for ocean governance, hydrography, and maritime decarbonisation, connecting Turkish regulatory agencies with international research networks.

- **7th National Marine Sciences Conference (7. Ulusal Deniz Bilimleri Konferansı — 7UDBK, 13–15 May 2026):** Hosted by DEÜ DBTE in İzmir (7UDBK Official Portal — 7udbk.org; 7UDBK Proceedings Book,

June 2026), the conference convened Türkiye's marine scientists across physical/chemical oceanography, marine biology, fisheries, marine geology/geophysics, and underwater archaeology, alongside the 2026 Hydrography and Oceanography Coordination Board Meeting.

- **6th Global Maritime Congress (GMC'26, 28–29 September 2026):** Co-organized by the DEÜ Maritime Faculty in international partnership with the University of Strathclyde (UK) (DEÜ GMC'26 Official Announcement), GMC'26 addresses green shipping corridors, autonomous vessels, port decarbonisation, and marine ecosystem protection.
- **International MoU with Bangladesh University of Engineering and Technology (BUET):** As documented in the 2025–2026 Sustainability Report (p. 158), DBTE executes a bilateral academic and research cooperation protocol with Bangladesh University of Engineering and Technology (BUET) on coastal engineering, deltaic/estuarine hydrodynamics, and climate-resilient marine infrastructure.
- **Underwater Student Community (DEÜSAT) Seafloor Clean-Up & Diving Operations (14–15 June 2025):** Within the Community Service Practices (Topluma Hizmet Uygulamaları) curriculum and SKS student society framework, the DEÜ Underwater Student Community (Sualtı Topluluğu — DEÜSAT) mobilized 45 certified student divers and volunteers on 14–15 June 2025 to conduct coastal and seafloor litter removal, extracting discarded plastics, ghost fishing gear, and metallic debris while cataloging benthic litter composition (Sustainability Report 2025–2026, p. 138).



Figure 7: DEÜ Underwater Student Community (DEÜSAT) Scientific Diving and Coastal/Seafloor Litter Clean-Up Campaign Conducted on 14–15 June 2025 with 45 Student Volunteers (Source: DEÜ Sustainability Report 2025–2026, p. 138).



Figure 8. The 7th National Marine Sciences Conference (7UDBK), held on 13–15 May 2026 in İzmir and hosted by DEÜ's Institute of Marine Sciences and Technology. Left: the official poster featuring the theme Türkiye's Blue Vision. Upper right: remarks by Institute Director Prof. Dr. Harun Özdaş. Lower right: a conference panel session. The Institute reports participation by 176 researchers, experts and stakeholders from universities, public institutions and the private sector. Sources: the official 7UDBK website and DEÜ's conference reports and photograph gallery.

Sources: Official conference website and poster | DEÜ opening programme and photographs | DBTE completion report 6 June 2026

10. Water-Sensitive Waste Disposal, Wastewater Pre-Treatment, and Marine Plastic Prevention

Preventing land-based chemical, organic, and plastic pollutants from reaching İzmir Bay is enforced across all 15 Zero-Waste certified DEÜ campuses through physical pre-treatment infrastructure, accredited chemical monitoring, and single-use plastic elimination.

- **100% Municipal Advanced Wastewater Treatment Connection & Pre-Treatment Interceptors (THE 14.4.1):** All wastewater generated across DEÜ campuses (total campus water consumption: 462,487 m^3 in 2025–2026, or 6.67 m^3 per person per year) is discharged via sealed municipal collectors to İZSU Advanced Biological Wastewater Treatment Plants (Çiğli and Güzelbahçe/SWTP). Before entering the municipal collector, campus effluents pass through closed grit chambers (kapalı kum tutucu) and cafeteria oil/grease interceptors (yağ tutucu), while 5.1 tonnes of waste vegetable cooking oil were collected separately in 2025–2026 for licensed biodiesel conversion, preventing sewer blockages and marine lipid slicks (Sustainability Report 2025–2026, pp. 74, 78, 87).

- **Hazardous Chemical & Medical Waste Containment via MOTAT/EÇBS (THE 14.4.3):** In 2025–2026, 44.1 tonnes of hazardous chemical/laboratory waste and 886.9 tonnes of sterilized medical waste from DEÜ Hospital and marine/engineering laboratories were stored in leak-proof bunded hazardous waste depots and transferred exclusively to licensed facilities via the Ministry of Environment's EÇBS / MOTAT Digital Tracking System, achieving zero unauthorized chemical discharge into coastal drains.
- **Plastic Waste Reduction Action Plan, DOA Reverse Vending Machines & 6th Environmental Days (THE 14.4.2):** Across 15 campuses holding renewed Zero Waste Certificates valid until 2031, plastic waste generation fell by 33.0% from 89.5 tonnes (2024) to 60.0 tonnes (2025) (with 66.5 tonnes sorted in the 2025–2026 cycle). Key interventions include three DOA Reverse Vending Machines (RVMs), free mains-connected drinking water dispensers, a 10 TL reusable thermos/cup discount in campus cafeterias, and the DEÜ 6th Environmental Days Symposium ('End Plastic Pollution', 4 June 2025) organized by the Department of Environmental Engineering and ÇEVuygar.



Figure 9: Closed Grit Chamber and Pre-Treatment Interceptor Infrastructure on DEÜ Campuses Preventing Sediment, Grease, and Untreated Effluent Discharge into İzmir Bay (Source: DEÜ Sustainability Report 2025–2026, p. 78).



Figure 10: DOA Reverse Vending Machine (left) and Mains-Connected Free Drinking Water Dispenser (right) Deployed on DEÜ Campuses to Eliminate Single-Use PET Bottles and Marine Plastic Litter (Source: DEÜ Sustainability Report 2025–2026, pp. 64–65).



Figure 11: Poster and Programme of the DEÜ 6th Environmental Days Symposium Held on 4 June 2025 Under the Theme 'End Plastic Pollution (#BeatPlasticPollution)' (Source: DEÜ Sustainability Report 2024–2025, p. 127).



Figure 12: Leak-Proof Hazardous Waste Temporary Storage Depots ('TEHLİKELİ ATIK') on DEÜ Campuses Preventing Chemical and Laboratory Runoff into Coastal Watersheds (Source: DEÜ Sustainability Report 2025–2026, p. 74).

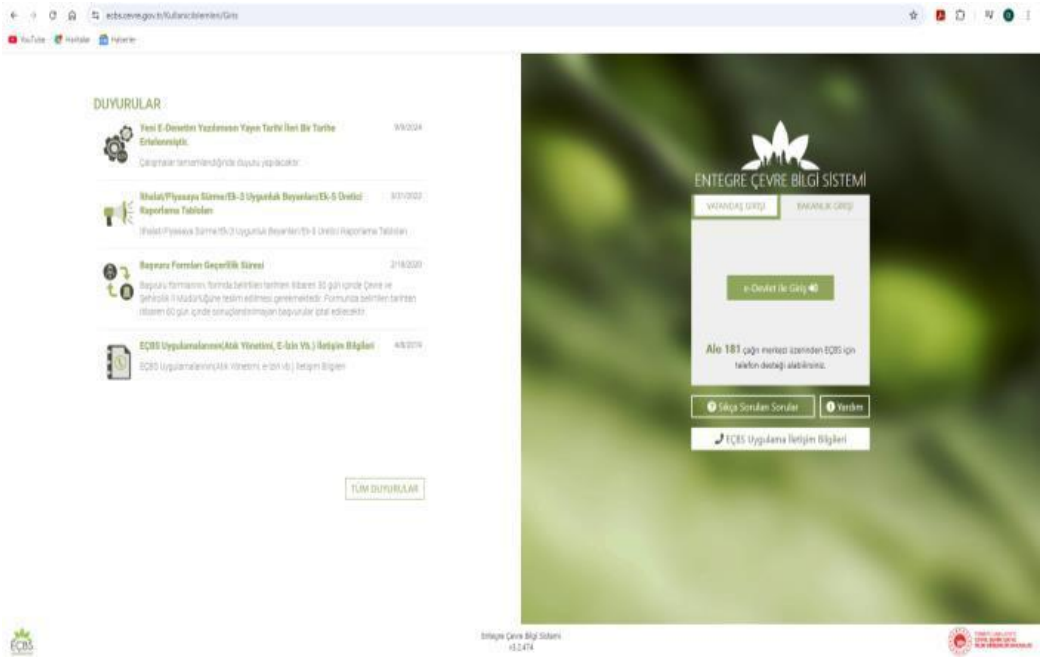


Figure 13: Ministry of Environment, Urbanization and Climate Change Integrated Environmental Information System (EÇBS / MOTAT) Used by DEÜ to Track Hazardous and Medical Waste Streams (Source: DEÜ Sustainability Report 2024–2025, p. 77).



Figure 14: Renewed Zero Waste Certificates (Valid Until 2031) Issued by the Provincial Directorate of Environment, Urbanization and Climate Change for DEÜ Campuses (Source: DEÜ Sustainability Report 2025–2026, p. 69).

11. UI GreenMetric 2025–2026 Cross-Walk and Watershed Management Strategy (THE 14.5)

Table 4 cross-references the official UI GreenMetric indicators reported in the DEÜ Sustainability Report 2025–2026 against THE Impact Rankings SDG 14 metrics, demonstrating how upland watershed retention at Central Campus and Buca directly protects coastal receiving waters at İnciraltı, Urla, and Seferihisar.

UI GreenMetric 2025–2026 Indicator	Verified 2025–2026 Institutional Value	Watershed & Marine Ecosystem Mechanism (THE SDG 14 Link)
1.4 / 1.15 Campus Setting & Total Land Area	5,532,681.53 m² total area across 15 campuses (including coastal campuses at İnciraltı [27,666 m²], Urla [8,840 m²], and Seferihisar).	Direct coastal stewardship along Southern İzmir Bay and the Urla–Seferihisar peninsula (14.5.1, 14.5.2).
1.9 Forest Vegetation Cover	3,111,315 m² (56.24% of total campus area).	Intercepts heavy Mediterranean winter rainfall, preventing soil erosion and suspended sediment plumes in İzmir Bay (14.5.5).
1.10 Planted Vegetation Area	137,833 m² (2.49% of total area; drought-tolerant native Mediterranean flora).	Eliminates synthetic fertilizer and pesticide leaching into coastal groundwater (14.4.3, 14.5.5).
1.11 Water Absorption / Permeable Area	1,384,477 m² (25.02% of total campus area).	Sponge-Campus aquifer recharge filters urban stormwater runoff before it reaches the Meles and Arap Deresi streams feeding İzmir Bay (14.5.5).
3.2–3.11 Zero Waste, Plastic & Hazardous Waste Control	593.0 t total waste (34.4% recycled); 66.5 t plastic sorted; 5.1 t waste cooking oil to biodiesel; 44.1 t chemical waste via MOTAT.	Prevents land-based marine litter, microplastics, and toxic chemical inflows into marine food webs (14.4.1, 14.4.2, 14.4.3).

UI GreenMetric 2025–2026 Indicator	Verified 2025–2026 Institutional Value	Watershed & Marine Ecosystem Mechanism (THE SDG 14 Link)
4.2 & 4.6 Wastewater Treatment & Water Pollution Control	100% connection to İZSU advanced biological treatment; closed grit chambers; regular Environmental Engineering lab water analyses.	Ensures all campus effluents meet municipal and receiving-water discharge standards (14.4.1, 14.4.3).
6.1–6.5 Sustainability Courses, Research & Patents	39 marine/maritime sustainability courses (DBTE 22, Maritime 17); 84 AVESİS SDG 14 records; SDG 14 patent & research clusters.	Directly drives THE 14.1 bibliometric/research indicators and 14.2/14.3 educational and technological action metrics.



Figure 15: Forested Watershed and Permeable Surface Zone at DEÜ Central Campus (3,111,315 m² Forest Cover and 1,384,477 m² Permeable Water-Absorption Area Across DEÜ Campuses, Preventing Stormwater Sediment Runoff into İzmir Bay) (Source: DEÜ Sustainability Report 2025–2026, p. 5).

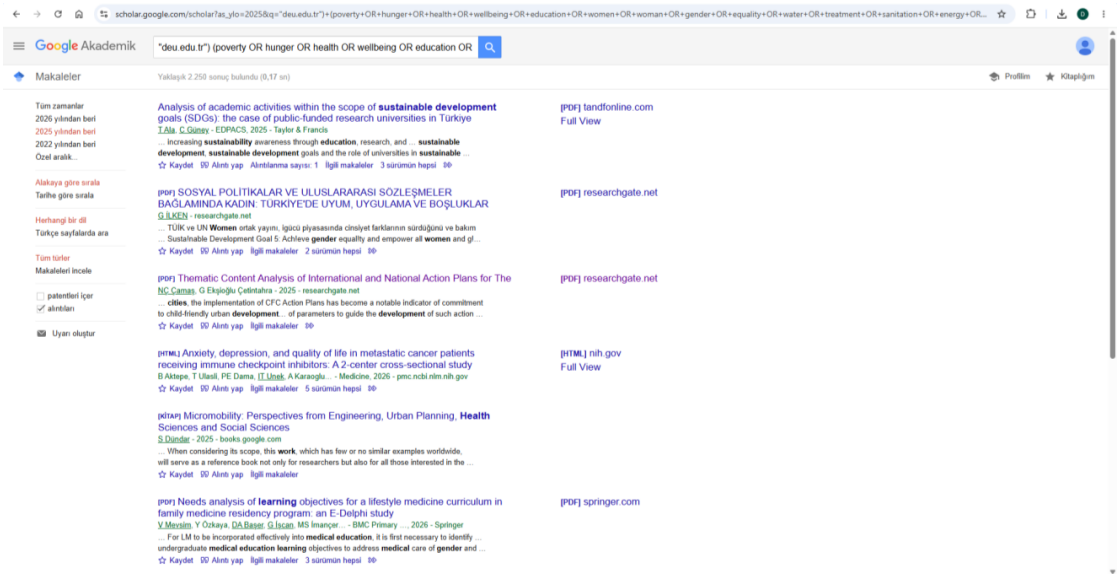


Figure 16: DEÜ Green Campus Sustainability Portal (greencampus.deu.edu.tr) Publishing SDG Progress Reports, Water Quality Audits, and Marine Biodiversity Action Plans (Source: DEÜ Sustainability Report 2025–2026, p. 113).

12. Institutional Performance Analysis and Barrier-Removal Roadmap for 2026–2027

To advance Dokuz Eylül University's performance in both Türkiye's Research University Monitoring Index (YÖK Araştırma Üniversiteleri Performans İzleme Endeksi) and the THE Impact Rankings 2027 SDG 14 assessment, Table 5 links each target indicator to its underlying driver, classifies existing institutional barriers, and assigns a concrete intervention, accountable owner, and verification date.

THE / Research Univ. Indicator & Driver	Barrier Classification & Root Cause	Targeted Intervention (2026–2027 Action)	Accountable Owner & Review Date
14.1.1–14.1.3 Marine CiteScore, FWCI & Q1 Output Driver: Multidisciplinary cruises & international co-authorship.	Resource & Incentive Barrier: High daily operating/fuel cost of R/V Koca Piri Reis and fragmented SDG keyword tagging in AVESİS.	Deploy SBB Marine Infrastructure Grant to co-fund international EMODNET/Horizon Europe cruises; mandate SDG 14 keyword verification in AVESİS before BAP project closure.	DBTE Directorate, BAP Coordination Unit & AVESİS Team Review: 30 November 2026
14.3.2 Sustainable Seafood Policy Audit Driver: Verifiable origin/species compliance in campus dining halls.	Information Barrier: Senate Decision No. 633/05 enforces Fisheries Law No. 1380 in tenders, but annual public seafood audit summaries are not published separately.	Publish an annual standalone 'Sustainable Aquatic Food Procurement Audit Note' on greencampus.deu.edu.tr listing procured species, catch zones, and zero-endangered-species certification.	SKS Department & DEÜ Sustainability Office Review: 15 October 2026
14.3.4 & YÖK Commercialization: Subsea Patents & Spinoffs Driver: TRL 6–8 sea trials of subsea sensors and antifouling capsules.	Capability & Resource Barrier: Gap between laboratory patent filing and industrial sea-trial validation on commercial aquaculture cages.	Establish a 'Living Marine Testbed' at DBTE İnciraltı Pier and Urla facility for SmartOceanics Inc. and DETTO patentees to run 6-month sea trials with Aegean aquaculture operators.	DETTO, DEPARK & DBTE Marine Technology Division Review: 31 December 2026
14.5.2 & 14.5.4 İzmir Bay & Çakalburnu Lagoon Public Bulletins Driver: Open-access ecological health reporting from İZKA–İZSU platform.	Information & Regulatory Barrier: Monitoring datasets remain dispersed across project reports rather than a single public dashboard.	Publish semi-annual English/Turkish 'İzmir Bay & Çakalburnu Lagoon Ecological Health Bulletins' summarizing dissolved oxygen, chlorophyll-a, plankton, and bathymetric data.	DBTE Directorate & Sustainability Office Review: 30 September 2026

13. Contact and Verified References

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