TRANSEATION

BLUE IS THE NEW GREY · NATURE-BASED SOLUTIONS

Advancing Ecosystem-Based Management through Hybrid Blue-Grey Infrastructures in Marine and Coastal Areas

D16.3 Policy Brief European Level

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Symbols, abbreviations and acronyms

D	Deliverable
EU	European Union
T	Task
WP	Work Package

1. POLICY IMPACT

TRANSEATION contributes directly to key EU policy priorities, including the European Green Deal, the EU Biodiversity Strategy for 2030, and the Mission "Restore our Ocean and Waters" by 2030. It offers a systemic approach to incorporating hybrid blue-grey infrastructures (HBGIs) into marine and coastal policy frameworks. By providing demonstrable examples of nature-based solutions combined with engineering structures in coastal protection, offshore energy, and aquaculture, TRANSEATION enhances biodiversity, resilience, and sustainable economic activity (European Commission, 2020; Faivre et al., 2017). It also facilitates the transition towards a climate-neutral Europe by embedding sustainable design into infrastructure development. This proactive alignment with the EU Taxonomy for sustainable activities ensures that project outcomes remain relevant for upcoming legislative frameworks, including future revisions of the Marine Strategy Framework Directive and the EU Nature Restoration Law.

Restoration ecology is increasingly recognised as a core strategy for addressing ecosystem degradation, yet short project cycles often hinder assessment and long-term investment (Eger et al., 2020; Zhang & Choi, 2018). The European Commission now promotes transformative Nature-based Solutions (NbS), yet concerns persist regarding definitional clarity, greenwashing risks, and insufficient criteria in marine applications (Riisager-Simonsen et al., 2022).

Meanwhile, marine and coastal infrastructures are proliferating to meet societal demands, replacing natural habitats and stressing biodiversity (Bulleri & Chapman, 2010). TRANSEATION directly addresses these trends by developing scalable hybrid blue-grey solutions that combine functionality and ecosystem regeneration. By integrating these systems into EU policy and regulatory frameworks, the project enables more effective and inclusive climate adaptation and marine governance.

2. IMPACT FOR CITIZENS AND COMMUNITIES

TRANSEATION improves marine ecosystem health, supporting communities reliant on fisheries, aquaculture, and coastal resilience. Its Citizen Science App empowers public engagement in marine monitoring, strengthening transparency and co-creation. Demonstration sites show potential for safer, more biodiverse coastlines and clean energy production. Local stakeholders benefit from regenerative designs that integrate environmental goals with social inclusion, contributing to climate adaptation, regional development, and participatory governance (Marine Policy, 2022). Additionally, the project promotes blue literacy and environmental awareness. Through workshops, exhibitions, and co-design sessions, it engages schools, women's associations, and local cooperatives in understanding the value of ecosystem services. These inclusive actions help democratise ocean knowledge and foster behavioural change towards marine conservation.

3. IMPACT FOR COMPANIES AND BUSINESSES

The project demonstrates economically viable HBGI solutions ready to scale across multiple sea basins. Examples include bio-based ropes for aquaculture and biodiversity units for offshore wind platforms. These innovations enhance TRLs and offer new markets for SMEs, creating green jobs while reducing plastic and carbon footprints. Industry partners like Saitec and Ocean Ecostructures are already applying results to commercial ventures, supported by open-access tools like 3D digital twins (TRANSEATION Consortium, 2025). It also opens new supply chains for circular bio-materials in aquaculture and modular ecological units for the offshore renewable sector. Demonstrator evaluations suggest potential for reduced operational costs and increased stakeholder acceptance, especially in Natura 2000 sites and regions with Blue Economy development strategies.

4. BARRIERS AND FUTURE NEEDS

Hurdles include fragmented certification frameworks, lack of harmonised standards for NbS in marine settings, and limited access to investment for upscaling. Environmental impact assessments (EIAs) vary significantly by Member State, complicating deployment. TRANSEATION recommends establishing EU-wide certification schemes for HBGIs, integrating EBM tools into national marine spatial planning (MSP), and enhancing funding streams for replication and long-term monitoring (European Commission, 2021; Riisager-Simonsen et al., 2022). Other challenges include conservative risk perceptions in infrastructure investment, limited training on NbS integration among engineers and planners, and fragmented marine data access. These can be addressed by capacity-building programmes, digital inter-operability standards, and an EU-wide task force on regenerative marine infrastructures.

5. MARKET READINESS AND IPR

TRANSEATION delivers innovations at high TRLs, including biodegradable aquaculture systems and digital monitoring platforms. Several technologies, such as GeoCorail artificial reefs and S-REEF biodiversity units, are undergoing market validation. Data-sharing tools comply with FAIR principles, and integration with EMODnet ensures accessibility and replicability. Project outputs are ready for commercial uptake, and partners are exploring intellectual property strategies for scaling regenerative marine infrastructures (TRANSEATION Consortium, 2025). Several partner organisations have expressed interest in pursuing joint ventures and licensing models for their innovations. The project's integration of AI-based biodiversity forecasting tools and automated compliance dashboards increases its value proposition in environmental monitoring markets.

6. TRANSEATION UNIQUE CONTRIBUTION

As part of the TRANSEATION project and within the scope of Task 10.3, a FAIR-compliant Data Sharing Platform has been developed to support data management and foster standardized, efficient access to project outputs. This technical platform facilitates both the uploading and downloading of datasets by project demonstrators, in line with the FAIR principles (Findable, Accessible, Interoperable, and Reusable).

The platform is organized into four main functional views: the Upload View, the Datasets View, the Socioeconomic View, and the COSEA View. This modular structure allows users to interact with the data according to their specific needs, enhancing usability and enabling targeted analysis.

Besides, this platform serves as a connection point to EMODnet Physics via ERDDAP integration and links manually to other EMODnet repositories, strengthening its interoperability with key European marine data initiatives. All datasets hosted on the platform undergo quality checks to ensure high data standards, reinforcing the reliability and scientific value of the project's outputs.

This high-quality data collected and shared through this platform will serve as a foundation for the development of digital twins and advanced modeling tools. These resources are essential for supporting evidence-based decision-making in marine and coastal management, aligning with the broader objectives of sustainable ocean governance and climate resilience.

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