

UNIDO Inputs – SG Report on Oceans and the Law of the Sea

Capacity building and the transfer of marine technology: New developments, approaches and challenges

The **United Nations Industrial Development Organization (UNIDO)** believes in the importance of developing strategic, partnership-driven frameworks to advance the development of sustainable blue industries and marine technologies. Through **UNIDO's Blue Industry Programmatic Framework**, which outlines UNIDO's targets to transform the blue economy through (1) improved livelihoods of coastal communities, (2) developed aquatic ecosystems, and (3) enhanced trade integration, the Organization is prioritizing innovative, sustainable solutions. Specifically, the Framework seeks to provide a coordinated, UNIDO-wide approach to the development of blue industries through maximizing the impact of UNIDO's current interventions, expanding efforts in emerging industries, and leveraging partnerships for knowledge sharing and innovations.

UNIDO's current interventions in capacity building and transfer of marine technology has had a lot of success. For example, in 2022, UNIDO and SIDS DOCK launched the **Global Ocean Energy Alliance (GLOEA)**, which provides a platform to connect SIDS and coastal developing countries of the Global South with the emerging ocean renewable energy industry of the Global North. Under the alliance, UNIDO has started supporting several SIDS in developing projects to promote the adoption of ocean energy technologies.

UNIDO is also using technology to support emerging blue industries such as seaweed. For instance, marine biotechnology can be applied to invasive seaweed which can be harvested to turn these otherwise harmful species into functional food, nutraceuticals, cosmeceuticals and other applications. Seaweed also has applications in bioenergy, especially biodiesel. In Indonesia, UNIDO is promoting sustainable seaweed through enhancing skills and technology development capacity (through enhancing curriculum of technical and vocational training institutions) and establishing effective skills and technology transfer mechanisms (through blended e-learning, etc.) through its **Quality and Standards Program (GQSP) and SMART-Fish programs**.

Recognizing the importance of partnerships and investment to advance the adoption of blue technologies, UNIDO is also scaling up its work with innovative blue finance actors, including accelerators and incubators, to offer critical support for marine technology innovations at different stages of development. This finance is critical to helping startups pilot their technologies in real-world environments and overcome barriers to market entry. UNIDO supported programs, such as the **Global Clean Tech Innovation Program, the Private Financing Advisory Network** or the **Bloom Cluster** in Barbados, have supported businesses and startups in blue clean technology products and services (e.g. use of seaweed for renewable energy and/or other productive uses).

As the maritime transport and trade sector requires significant technological innovations to reduce GHG emissions and improve productivity, UNIDO is further aiming to strengthen its support of the sustainable shipbuilding and port e-logistics sectors. Achieving decarbonization and technological innovation will depend on UNIDO developing strategic partnerships, enabling policies such as carbon levies, and investments in renewable energy, fuel infrastructure, and zero-carbon technologies. Reducing GHG emissions and improving environmental sustainability are also among the drivers behind the digital transformation of maritime logistics.

UNIDO's contributions to the **Blue Economy** further highlight the organization's focus on fostering sustainable development while maximizing economic opportunities. In Morocco and Tunisia, for example, UNIDO has demonstrated the business case for **resource efficiency in the fish and seafood processing industries** through the TEST methodology. These efforts include **valorizing by-products**, such as turning fish waste into marketable goods, and developing circular business models that mitigate marine plastic pollution by **upcycling fishing gear and aquaculture equipment**. Such initiatives not only protect marine ecosystems but also enhance economic resilience of coastal countries.

UNIDO's work in Sudan highlights the **economic and ecological value of ecosystem services**. Through the "Building Institutional Capacities for an Ecosystem Approach to Management of the Marine Fishery in the Red Sea State (Phase II)" project funded by Norway, tools such as the Fisheries Statistics System (FSS) and Ecosystem Approach to Fisheries Management (EAFM) empowered stakeholders to adopt data-driven conservation strategies. A landmark economic valuation study quantified the financial value of provisioning, regulating, and cultural services, equipping policymakers with evidence-based insights to balance conservation with economic development. The project also advanced ocean literacy in Industry through targeted campaigns and guides, fostering a deeper understanding of marine biodiversity's role in economic and community resilience.

Further underscoring UNIDO's commitment to marine sustainability, its initiatives **address marine plastic pollution by promoting circular economy principles**. UNIDO's USD 21.4 million portfolio under the **GEF Plastic Integrated Program** fosters the development of sustainable alternatives to single-use plastics and minimizes waste entering marine ecosystems.

UNIDO also supports the **GEF-8 Clean and Healthy Oceans Integrated Program (CHOIP)**, where it works with partners from FAO, ADB, AfDB, CAF, EBRD and UNEP to facilitate portfolio coordination, knowledge sharing, and capacity building across 14 countries addressing nutrient pollution and hypoxia.

UNIDO is also a key player in enhancing capacity building and transferring marine technology to address critical marine challenges. By **leveraging innovative methodologies** such as Resource Efficiency and Cleaner Production (RECP) and the Transfer of Environmentally Sound Technology (TEST) approach, UNIDO equips industries with the tools and knowledge to mitigate land-based sources of marine pollution. A notable achievement is the GEF-funded TEST-Niger project, which assessed 426 industrial effluent discharge sites, enabling a 37% reduction in wastewater discharge volumes and a 36% decrease in pollution loads. These efforts improved water quality and reduced stress on marine biodiversity while fostering sustainable industrial practices through tailored capacity-building programs.

To **address residual industrial wastewater pollution**, UNIDO is advancing its work on **nature-based infrastructure (NBI) solutions** as a complementary approach. By integrating NBI solutions such as wetland restoration, riparian buffer zones, and constructed wetlands, UNIDO aims to enhance the natural filtration of pollutants, reduce environmental pressures, and create co-benefits for biodiversity conservation and local communities. These approaches align with the objectives of SDG 14 (Life Below Water) while contributing to multiple SDG targets, including those related to clean water and sanitation (SDG 6), climate action (SDG 13), and sustainable cities and communities (SDG 11). The organization's work in this area underscores the importance of aligning industrial processes with ecosystem services to achieve sustainable and resilient marine environments.

Regional initiatives such as the GEF funded Gulf of Guinea Large Marine Ecosystem (GCLME) project demonstrate UNIDO's commitment to **addressing point-source pollution** and enhancing ecosystem resilience. In pollution hotspots, the project mobilizes the private sector to implement scalable pollution reduction measures, conduct resource use and pollution assessments, and introduce tailored interventions such as water reuse systems and nutrient recovery. These efforts are coupled with feasibility studies and innovative financing mechanisms to ensure sustainability while promoting knowledge-sharing and policy integration for broader regional impact.

Through these initiatives, UNIDO exemplifies the integration of technology transfer, capacity building, and innovative practices to enhance marine conservation and resilience. By aligning efforts with global frameworks, including advancing NBI and Ecosystem Approach to Fisheries Management (EAFM) approaches, the organization demonstrates scalable, impactful solutions that address the evolving challenges of marine ecosystem management while contributing to sustainable development goals.

Despite these achievements, challenges persist in advancing capacity building and technology transfer. These include limited financial and technical capacities, the complexity of integrating innovative approaches like the TEST methodology and NBI solutions, and the need for harmonized regulatory frameworks across transboundary waters. UNIDO addresses these through targeted capacity-building programs, innovative financing mechanisms, and partnerships, as demonstrated by TEST-Niger's economic and environmental successes. Additionally, tools like the FSS and economic valuation studies provide policymakers with data-driven insights into the tangible benefits of conservation. These adaptive strategies ensure the systematic removal of barriers, enabling scalable, impactful solutions for sustainable marine ecosystem management.