Advancing Ocean Data Exchange with the EU Blue Economy

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Abstract: The growth of a sustainable and competitive blue economy in Europe is accompanied by an exponential generation of ocean data. However, the surging amounts of data collected by the private sector are often locked. This is a missed opportunity. The authors unpack this paradox from the perspective of the Sustainable Blue Economy Partnership, a cross-sectoral collaborative initiative co-funded under the EU Research and Innovation Framework Programme. They argue that the private sector should be engaged in building a fit-for-purpose European Ocean Observing System. While promoting the value proposition of enhanced access to ocean observation data across science, policy and business for evidence-based decision-making, the authors outline practical ways to advance corporate data exchange in support of the implementation of the EU Ocean Pact, from mobilizing the private sector with targeted incentives, to developing an enabling regulatory framework and advancing innovative data sharing schemes.

Keywords: Ocean observation value chain, Marine Data Sharing, EU Ocean Pact, Sustainable Blue Economy Partnership, Private sector

1. INTRODUCTION

Earlier this year, the launch of OceanEye[1] by Ursula von der Leyen, President of the European Commission, showcased that ocean observation is a strategic priority for the implementation of the EU Ocean Pact and the development of an EU Ocean Act. Ocean observation is the foundation of all marine knowledge. From data collection to evidence-based decision-making, enhancing the ocean observation value chain is a multi-stakeholder endeavor underpinning sustainable ocean planning and management for resilient societies.

1.1. A Paradox: Lacking data amidst an explosion of data

The future EU Ocean Act[2] shall provide the legal basis for an integrated, cost-effective, reliable and secure European ocean observation system. With the lack of resources, disruptive risks and data gaps counting to the challenges, the paradox is striking: Europe is currently experiencing an exponential growth of ocean observation data. Collected by marine-based industries to foster competitiveness, these surging amounts of data go hand in hand with the strong growth trajectory of the EU blue economy[3]. Companies operating in the marine environment, such as renewables, aquaculture and shipping, constantly gather data for multiple purposes - design and maintenance, regulatory compliance, and smart optimization. Stakeholder consultations suggest that the offshore wind industry would lose 67% its economic value without access to critical ocean observation data[4]. Single global geo-data companies like Fugro[5] operate dozens of vessels worldwide, each of them collecting vast amounts of subsea, seabed and water column information every day. The scale and value of this data to manage climate, pollution and biodiversity risks is enormous. However, despite apparent benefits for all stakeholders, corporate data sharing remains the exception in most cases. Industry ocean data is mostly locked - either stuck at national agencies or remaining completely hidden in proprietary archives. This is a missed opportunity.

1.2. Research objectives: Investigating the feasibility of normalizing EU corporate data exchange

In support of a fit-for-purpose European Ocean Observing System, the Sustainable Blue Economy Partnership ("Partnership") launched a pilot activity to promote corporate data exchange[6], hereby

defined as the 'sharing and re-use by the blue economy of ocean-related datasets to maximize their value proposition'. As a cooperation instrument under the 9th EU Research and Innovation Framework Programme, the Partnership delivers innovative solutions to boost a climate-neutral, regenerative and resilient blue economy across European coasts through the green and digital transitions. Together with the European Commission, 81 partners (governments, research, regional and public authorities) from 32 countries foster a holistic approach to ocean governance grounded in robust marine knowledge. By catalysing the Partnership's unique community of actors at the interface between science, business and policy, this pilot activity is investigating the normalization of corporate ocean data exchange as a means to fostering competitiveness, resilience and sustainability in the EU blue economy: To which extent can corporate ocean data wealth be leveraged in Europe, in conjunction with research and monitoring-driven data collection, to power the next generation of forecasting, modelling systems, and sustainable, profitable business solutions for current and future generations?

1.3. Methodology: From scoping incentives to enabling action

Following an impact pathway approach, this pilot activity began with a scoping phase to identify incentives and obstacles for the engagement of the private sector, policy recommendations to optimize the use of ocean data produced by the blue economy across borders and sectors, and impactful action pathways for the Partnership. To develop a comprehensive understanding of opportunities and challenges at stake, this exercise addressed overarching questions:

1. Which non-sensitive datasets should be prioritized for existing and future user needs?
2. Which blue economy sectors should be targeted for scaling corporate data exchange?
3. What are the mechanisms to authorize sharing of ocean data collected by the private sector in the territorial waters, and what are current regulatory barriers alongside licensing and permitting within national ocean observing and monitoring systems?
4. What are key priorities to foster standardization of industry marine data?
5. What are current and future data sharing models involving startups, investors, insurers?
6. Which specific incentives, use cases and success stories should be promoted to foster the engagement of the private sector, and what are business requirements to foster structured, secure and transparent cross-sectoral data management frameworks according to the FAIR Principles and towards systematic corporate data submissions and integration to EU marine data services and the European Digital Twin of Ocean?
7. What are the different perceptions of the value of data across policy, research, finance and business, and how to bridge them?
8. To which extend is open data limited by the geopolitical context?
9. What are approaches to marine data valuation, and how does marine data contribute to improve standardized ocean accounting?
10. To which extent can corporate data sharing strengthen interoperability between sustainability-related disclosure frameworks to support corporate governance and ocean stewardship?

1.4. Preliminary results: Needs for appropriate integration of public and private ocean observation

Building on existing literacy, exploratory interviews and targeted mobilisation, the Partnership has conducted a series of closed workshops with experts from the private sector, public authorities, researchers, data managers, cooperation partners (e.g., European Marine Observation and Data Network, EMODnet[7]) and relevant stakeholders. Preliminary results point to three main priorities to advance corporate data exchange in support of the evidence-based development of the EU blue economy: 1) cross-sectoral mobilisation with an engaging storytelling, 2) an enabling policy framework to optimize marine data governance, as well as 3) innovative, trusted and secure data-sharing schemes.

2. ENGAGING WITH THE PRIVATE SECTOR

Mobilisation is the first step to incentivising corporate data sharing. While the EU blue economy increasingly produces massive amounts of marine data, companies are often not aware of the value proposition of this data for research and other user needs. Even when companies are willing to share

their data, entering unknown fields can be discouraging. The fragmented landscape of open ocean data repositories, combined with a lack of collection standards, requires additional efforts to process and deposit data. Such costs make it essential to leverage and build upon existing instruments, infrastructures and expertise to lower barriers and enable scalable, sustainable data sharing.

2.1. Targeting key incentives

When engaging the private sector, it is crucial to target the right incentives by highlighting the relevant benefits of data sharing from a business perspective: by improving data availability and filling knowledge gaps, data sharing facilitates environmental risk management, drives innovation and technological development - especially when using Artificial Intelligence (AI) - and increases business performance with data-driven modelling and forecasting tools. In the aquaculture sector, data sharing also answers the rising demand for traceability by consumers. The shift towards aquaculture 4.0, with the use of sensors, automation, AI and data analytics, is nurtured by potentially extremely high return on investment. By focusing on precision, data-driven technologies support the trend towards autonomous farming systems capable of pro-actively mitigating systemic risks such as mass mortality and harmful algal bloom events.

2.2. Promoting success stories

Convincing narratives build on success stories such as the Ocean Decade Corporate Data Group[8]. Spanning fisheries, energy, telecommunications and marine contracting, this group of industrial marine-based companies co-chaired by Fugro and the Intergovernmental Oceanographic Commission (IOC/UNESCO), has successfully supported the Seabed 2030[9] Project's joint mission by the Nippon Foundation and the General Bathymetry Chart of the Ocean to deliver a complete map of the seafloor. From 6% being mapped in 2017 to 27% in 2025, progress has significantly accelerated with the active collaboration of the private sector, encouraged by the fact that the need for bathymetric data is a common denominator across science, policy and business. Scaling such best practices initiated through industrial leadership offers a clear pathway to multiply impact and to close data gaps to achieve "the science we need for the ocean we want"[10].

2.3. Facilitating data sharing

Encouraging the private sector to share ocean data requires capacity-building in recognition of a simple reality: data sharing is not part of present business operations and must therefore be made as easy, low-cost and low-risk as possible. In this context, the bathymetry and the marine megafauna data sharing guidelines[11],[12] produced by the Decade Corporate Data Group and the Decade Coordination Unit for Ocean Data Sharing[13] are user-friendly tools which clarify standards, reduce the administrative burden, and address concerns around confidentiality and use. In parallel, efforts are underway to address the fragmentation of the landscape of open repositories and their diverse data ingestion requirements at the global level. In this context, EMODnet serves as an integrated marine data service platform that facilitates private sector participation by reducing barriers to engagement through its Associated Partnership Scheme. EMODnet builds upon the long-standing International Oceanographic Data and Information Exchange (IODE) network of National Oceanographic Data Centres (NODCs). Within the IOC/UNESCO framework, these centres are mandated to manage and disseminate millions of ocean observations, thereby supporting data stewardship and standardization, and improving open access to marine data.

3. IMPROVING PUBLIC MARINE DATA GOVERNANCE

The contribution of the private sector to the data ecosystem is a key indicator identified by the UN Decade of Ocean Science for Sustainable Development ("Ocean Decade") towards the achievement of a sustainable, equitable and resilient ocean economy.[14] Improving public and private ocean data accessibility policies is a main recommendation by the Organisation for Economic Co-operation and Development (OECD) to achieve the full potential of a sustainable ocean economy by 2050[15]. However, the blue economy's willingness and efforts to support the development of a fit-for-purpose ocean observing system are still hindered by a lack of trust caused by multiple inefficiencies in EU

public marine data governance, such as legal uncertainty, fragmented und unsecure data flows, and a lack of standardized quality.

3.1. Building trust at national level: Mandatory corporate data sharing

Throughout the Partnership's scoping workshops, industry stakeholders consistently spoke in favor of mandatory data sharing as a means to clarify and simplify regulatory frameworks, hence driving sustainability and competitiveness. Indeed, existing restrictive policies hinder companies from sharing even non-sensitive marine data without requesting public authorization. Such obstacles increase the administrative burden, foster uncertainty and risks, and blur the value of data sharing. Therefore, and following the policy recommendation developed by the Decade Corporate Data Group, the Member States of the IOC/UNESCO have adopted a decision fostering the establishment of national data-sharing policies and standardized practices in order to improve access to and unlock large volumes of data generated by industry[16]. One pathway of doing so is to include mandatory conditions into offshore licensing agreements and permitting following the example of the United Kingdom, where the Crown Estate[17] introduced such a contractual clause and successfully invested in the gathering of marine data and evidence to accelerate offshore energy development. Another pathway is to include mandatory sharing as a non-price award criterion in public tenders, drawing on lessons-learned from the Dutch wind farm "Ecowende"[18].

3.2. Building trust at sea basin level: Harmonized collection methods

Besides restrictive policies, another major obstacle to leveraging the value proposition of ocean data generated by the blue economy, is the fragmentation of national observing and monitoring systems as well as the lack of standardized protocols. Across EU Member States, economic sectors and specific projects, public authorities in charge of licensing, permitting and environmental monitoring rely on different data collection methods, resulting in fragmented quality formats and preventing data comparability and reusability. However, the development of approaches to measure the cumulative pressures from human activities on marine ecosystems and biodiversity requires not only a critical mass of data but also a specific level of spatial and temporal data resolution and quality. Therefore, it has become clear that streamlining data quality at the level of regional sea basins is necessary for the achievement of good environmental status and for the implementation of an ecosystem-based management approach of maritime spatial planning. In the North Sea, such efforts are conducted by the working track "Cumulative Impact Assessment" of the Greater North Sea Basin Initiative[19]. The current review of the Marine Strategy Framework and Maritime Spatial Planning Directives is also informed by good practice at national level to standardise data quality, such as in Belgium with the centralised environmental monitoring of the offshore wind sector[20].

3.3. Building trust at EU level: Secure data-sharing architectures

Data sensitivity is another challenge to advance corporate data exchange. The offshore wind industry collects huge amounts of data - physical and geospatial (bathymetry, seabed composition, …), metocean (wind, wave, currents, temperature, ...), environmental and ecological (biodiversity, water quality, underwater noise, …), engineering and infrastructure (design validation, transmission efficiency, …), socio-economic (visual impact, …). While some data is produced and shared to fulfill compliance according to country-specific regulatory requirements, non-sensitive data is used to inform operations and might be directly shared on open data repositories (bathymetry with low resolution, marine mammals). Conversely, datasets such as seabed morphology and wind profiles often remain locked, as they are considered competitive strategic assets within the business models of offshore developers. Fisheries data are also highly commercially sensitive since they can reveal fishing strategies. Despite their sensitivity, fisheries data are regularly misused and even commercialized by third parties[21]. Such practice undermines trust even more since the significant time and resources invested by fishers in data collection and management for compliance are already considered a burden. This calls for secure data management and clear legal frameworks governing data ownership, access, and use, to maintain trust in data-sharing pipelines and ensure a just transition across blue economy sectors.

4. CONCLUSION

In the era of digitalization, harnessing the potential of digital technologies is essential to unlock the full potential of a sustainable ocean economy. Reflecting the transition towards data-driven ocean management, emerging and transitioning blue economy sectors are driving the demand for high-quality ocean data, affordable ocean observation technologies, and value-added analytics. The market is evolving beyond free and open data services towards secure-by-design, software-centric and domain-specific systems[22]. In that context, the research conducted by the Partnership indicates that the necessary conditions for ocean data sharing between business and research are not yet in place. However, the scaling of corporate ocean observation raises the question of how public and corporate ocean observation can coexist and complement each other to deliver a fit-for-purpose European Ocean Observing System. This question calls for bridging gaps between value perceptions of ocean data across communities of practice.

4.1. Bridging data value perceptions across the public and private sectors to create a shared value proposition

While the public sector emphasizes ocean data as a public good serving broader societal and scientific objectives, the private sector traditionally treats data as a strategic asset, reflecting the costs and risks associated with its collection, management, and sharing.[23] This divergence creates an inherent tension between open data principles and market-based approaches to data valorization. Although the green and digital transitions support the shift away from this traditional dichotomy, failing to acknowledge and address these differences continues to hinder cross-sectoral collaboration and the emergence and normalization of sustainable data-sharing schemes. The recent bankruptcy of AquaCloud[24] illustrates that data-sharing business models cannot succeed without a clear and balanced value proposition - one that delivers tangible benefits not only to data users, but also to those generating and providing the data. In that context, opting for the word “exchange” over “sharing”, intends to emphasizing the mutual advantages of sharing and gaining access to an increased volume of available evidence.

4.2. The role of research in developing innovative data-sharing schemes

Within the blue economy, the value of data is layered across different communities of practice. This calls for data-sharing models that reflect sectoral needs and constraints. For example, the replication to other blue economy sectors of the initiative “10,000 Ships for the Ocean”[25] dedicated to ship-based observation shall consider distinct and sector-specific data types, sensitivities and value chains. Beyond fostering public-private data partnerships, researchers play a key role as knowledge brokers and data stewards who normalize data sharing in their own communities and support the evidence-based use and restoration of the ocean. Greater investment in research and innovation is also necessary to deliver innovative and co-designed data-sharing products and services, such as pre-standardized, scalable, low-cost sensors. In that sense, and building on established European infrastructures such as EMODnet, the Copernicus Marine Service and the European Digital Twin of Ocean, the co-design of OceanEye and the realization of the moonshot “ocean observation” within the next EU Research and Innovation Framework Programme, will support the normalization of data sharing at the interface between business, policy and science. Ultimately, a multistakeholder approach is the condition to move from a fragmented and threatened, to a holistic and flourishing ocean data ecosystem serving as critical infrastructure in Europe.

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