The Global Ocean Observing System

unesco Intergovernmental Oceanographic Commission

WORLD METEOROLOGICAL ORGANIZATION

UN environment United Nations Environment Programme

International Science Council

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Background paper

Session:

Day 1, Item 2.3

Agenda item:

GOOS ocean indicator framework

Introduction/Background

Including links to relevant documents, mandates etc.

Ocean science, supported by ocean data and disseminated through ocean, weather, and climate services, provides the foundation for evidence-based decision-making. To maximize the impact of ocean science, there is an urgent need to translate raw data into practical guidance and tools that can be directly applied by policymakers and practitioners. Ocean indicators are crucial for monitoring the state and health of the ocean, and when effectively designed, they support informed decision-making. Moreover, they play a key role in ecosystem- and knowledge-based approaches, which are essential for ocean governance, management, and stewardship, ensuring the protection, sustainability, and resilience of the ocean. Reconciling inconsistencies in methodologies, data sources, and baselines used to generate ocean indicators is essential to prevent the dissemination of fragmented or contradictory ocean information. An international, multidisciplinary approach will enhance the coherence of ocean knowledge, better informing policy and decision-making. The Global Ocean Observing System (GOOS) has established a task team on ocean indicators, bringing together experts from various fields to advance the characterization of a core set of indicators for monitoring changes in the marine environment. The task team seeks to create a scientifically agreed-upon foundation for developing robust ocean indicators through international and multidisciplinary collaboration. By providing a standardized framework, the team aims to improve the accuracy, consistency, and utility of ocean-related data for global monitoring and decision-making. This standardization is critical for aligning international efforts, tracking progress under global environmental agreements, and offering actionable insights for climate adaptation, sustainable development, and climate-resilient pathways.

Current status

The task team on ocean indicators driven by the 3 panels of GOOS has now outlined the methodological framework for building standardized ocean indicators (e.g., definition, evaluation approach), and developed criteria for indicator development, and demonstrate the application of the framework. Moreover, a set of 9 pilot indicators across the three major GOOS panel themes has been proposed (Fig. 1). A scientific publication to be submitted to peer-review has been drafted, and is about to be ready for submission to the Journal of Marine Policy (submission planned for March 2025).

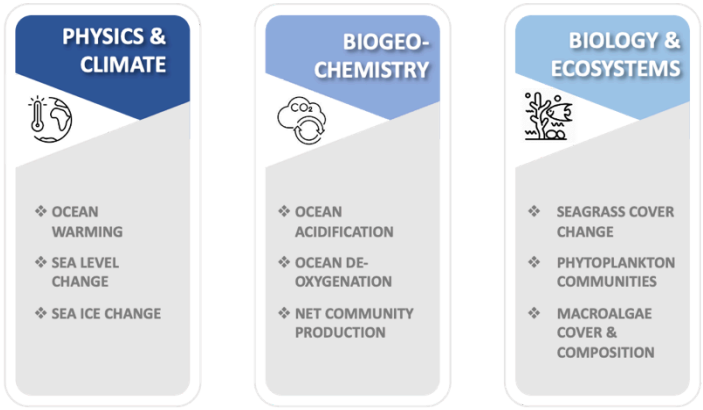

Fig. 3: Overview on the 9 pilot indicators as proposed by GOOS on ocean indicators for three environmental dimensions of the ocean: physics & climate, biogeochemistry, biology and ecosystems.

Work/Project plan

Including Deliverables (e.g. Activities/Actions/ KPIs) and Budget / Resource needs

➔ 2025

➔ 2026-2027

Project plans include:

Short-term (2025): pass peer review of the scientific foundation for the international framework on ocean indicators (Journal of Marine Policy); engage with GOOS for further implementation, including visibility on the web-portal, identify linkages and implementation options across GOOS, and with the UN Decade on Ocean Science. Define the connection between the Essential Ocean Variables and the ocean indicators.

Resources needed: Engagement from the three panels/officers to finalise the paper. Support for communication (GOOS Newsletter etc.)

Mid-term (2026-2027): Benefit from the proposed pilot indicators for regular reporting on the ocean state, variability and change as part of annual reporting (e.g., IOC State of the Ocean Report). In addition, identify and agree on ocean regions, and explore opportunities for regionalized regular (annual) reporting of ocean indicators, taking into consideration observational capabilities within the GOOS Regional Alliances.

Engage with international assessment activities seeking for integration of the pilot indicators in relevant reporting assessments (e.g., IPCC, WOA, IPBES, WMO).

Resources needed: Secretariat support to explore regionalization and GRAs capacities to engage with this process. Secretariat support to explore integration into other reporting assessments.

Long-term: Engage and create momentum for the development of ocean narratives to connect GOOS ocean indicators with socioeconomic indicators, as well as to interlink to ongoing global dialogues (e.g., UNFCCC GGA). Continued dialogue with the GOOS panels for the expansion of the framework (e.g. developing further relevant indicators).

Resources needed: Participation in relevant international fora; Engagement of the GOOS panels/other experts to expand the framework.

Expected outcomes for GOOS

As a result of this workplan, GOOS would deliver:

- ☐ A new international framework for ocean indicators, jointly developed by multiple ocean expertise and in support of the global ocean observing system
- ☐ A new tool for strengthening evidence-based and consistent regular reporting from the global ocean to the regions, leveraging the essential ocean variables framework.
- ☐ A new tool essential for the development of ocean narratives, which allow for leveraging the critical role of the ocean, and associated ocean measurements, driven by linkages of ocean change and functioning to socioeconomic relevance.

GOOS can benefit from:

- Strengthened link between the 3 panels of GOOS, fostering multidisciplinary collaborative approaches
- Established connection between the ocean indicator framework and the EOV framework, stressing the importance of observations/data to support the assessments
- Greater visibility and contribution of GOOS to ocean policy processes

Considerations for the GOOS Steering Committee

- How should this activity develop to make sure it is fully integrated into GOOS? Webpage, formal recognition by the SC and or IOC?
- Could there be a section led by GOOS based on these Indicators in the IOC State of the Ocean Report?
- Identify GOOS Ocean regions for which a regionalization approach can be applied for regular reporting on ocean indicators
- Identify and engage in linkages with international assessment activities for integration of the GOOS pilot indicator themes in their activities
- Identify leveraging points for scientific activity around new indicators, and ocean narratives for observing system recommendations, and cross-links with GOOS relevant programmes & initiatives and the UN Decade for Ocean Sciences.

Proposed decisions/recommendations

- The GOOS Steering Committee appreciates the progress undertaken in the framework of the Task Team on Ocean Indicators, welcomes the preparation of a paper by the Task Team and supports the continuation of the work.