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Food for Thought

Marine Life 2030: building global knowledge of marine life for local action in the Ocean Decade

Frank E. Muller-Karger[1,*], Gabrielle Canonico[2], Claudia Baron Aguilar[1], Nicholas J Bax[3], Ward Appeltans[4], Kristen Yarincik[5], Venus Leopardas[6], Isabel Sousa-Pinto[7], Masahiro Nakaoka[8], Akkeshi Aikappu[8], Jonatha Giddens[9], Emma Heslop[10], Enrique Montes[11] and J. Emmett Duffy[12]

[1] College of Marine Science, University of South Florida, 140 7th Ave South, St. Petersburg, FL 33701, USA
[2]US Integrated Ocean Observing System, NOAA , Washington, DC 20230, USA
[3]Oceans & Atmosphere, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Hobart, Tasmania, Australia
[4]Ocean Biodiversity Information System (OBIS), United Nations Educational Scientific and Cultural Organization, Oostende, Belgium
[5]Consortium for Ocean Leadership, Washington, DC 20005, USA
[6]Mindanao State University at Naawan, Naawan, 9023 Misamis Oriental, Philippines
[7]CIIMAR—Interdisciplinary Centre of Marine and Environmental Research, University of Porto, Terminal de Cruzeiros de Leixões, Av. General Norton de Matos s/n, 4450-208 Matosinhos, Portugal
[8] Akkeshi Marine Station Field Science Center for Northern Biosphere, Hokkaido University, Aikappu Akkeshi, Hokkaido 088-1113, Japan
[9]Exploration Technology Lab, National Geographic Society, Oahu, HI 20036, USA
[10]Intergovernmental Oceanographic Commission, UNESCO, 7 Place Fontenoy, Paris 75352, France
[11]Atlantic Oceanographic and Meteorological Laboratory (AOML), NOAA, Miami, FL 33149, USA
[12] Tennenbaum Marine Observatories Network and MarineGEO Program, Smithsonian Environmental Research Center, Edgewater, MD 21037-0028, USA

*Corresponding author: tel: +1-727-776-3759; e-mail: carib@usf.edu

Marine Life 2030 is a programme endorsed by the United Nations Decade of Ocean Science for Sustainable Development (the Ocean Decade) to establish a globally coordinated system that delivers knowledge of ocean life to those who need it, promoting human well-being, sustainable development, and ocean conservation. It is an open network to unite existing and new programmes into a co-designed, global framework to share information on methods, standards, observations, and applications. Goals include realizing interoperable information and transforming the observation and forecasting of marine life for the benefit of all people. Co-design, sharing local capacity, and coordination between users of ocean resources across regions is fundamental to enable sustainable use and conservation. A novel, bottom-up networking structure is now engaging members of the ocean community to address local issues, with Marine Life 2030 facilitating the linkage between groups across different regions to meet the challenges of the Ocean Decade. A variety of metrics, including those proposed by the Group on Earth Observations, will be used to track the success of the co-design process.

Keywords: biodiversity, co-design, Marine Life 2030, Ocean decade.

The need

The ocean we want hosts abundant and diverse life that supports humanity's needs for food, natural products, and good livelihoods (Estes *et al.*, 2021). The ocean's >200000 species are the engine of ecosystems that provide these benefits. Governments and researchers worldwide have recognized the need for trusted information on marine life to evaluate the status and trends of marine species and habitats that underpin these "ecosystem services". The need for information about marine biodiversity is expressed in national plans and in many international conventions, including the U.N. Sustainable Development Goals (SDG), the Ramsar Convention on wetlands, the Convention on Biological Diversity (CBD), the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), and the United Nations Convention on the Law of the Sea (UNCLOS). But this need has not been addressed. Obtaining usable information on marine biodiversity requires solving numerous challenges, including building capacity for biodiversity science, promoting the regular and systematic collection of observations, and linking these more directly to the needs of users and communities. Tracking of marine life requires rigorous metrics of the distribution, abundance, and interactions between organisms and diverse species. It requires linking biodiversity, environmental, and social and economic data. At present, management of marine living resources often relies on proxy

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variables like temperature, salinity, chlorophyll, and topography, commonly without measuring the type and abundance of organisms. Great swaths of the ocean remain unstudied for marine life (Satterthwaite *et al.*, 2021). We need to fill these gaps strategically if we want to follow the model of meteorology and weather services around the world, which provide routine and reliable forecasts on which we all depend for daily activities.

The plan

Co-design and sharing local capacity are fundamental to address problems of sustainable use and conservation. In 2021, over 60 private, government, academic, and civil society organizations teamed up to change the way that we network society to understand and forecast marine life. They organized the Marine Life 2030 programme endorsed by the United Nations Decade of Ocean Science for Sustainable Development (the Ocean Decade) (see http://marinelife2030.org). Developing trust and relationships is essential to address local problems associated with changing marine life. One innovation of Marine Life 2030 is the goal of developing a novel, bottom-up networking structure to engage diverse parties of the ocean community—scientists, resource users, and decision-makers at all levels. Partners in Marine Life 2030 from around the world are linking local groups of citizens, users of information, and researchers in conversations about their issues. Discussions include indigenous peoples and local communities and their needs.

Linkage between regions is coordinated by topic leads in (1) co-design and stakeholder engagement, (2) capacity development, (3) community science, (4) interoperability of methods and observations, (5) Early Career Ocean Professional (ECOP) involvement, and (6) coordination and communications. Marine Life 2030 leverages innovation in 'omics, acoustics, imaging, remote sensing, and artificial intelligence to capture biodiversity information more efficiently. The goal is to integrate missing pieces into a global ocean observing system to align biodiversity data with other ocean data and other disciplines and co-deliver solutions. An emphasis on Essential Ocean Variables helps promote interoperability of biological observations. Observations are made by a broad range of contributors worldwide. Compatibility between measurements helps to compare observations between different places and over time. This is fundamental to detect changes and to understand relationships between local and global changes in biodiversity and ecosystem services and is the reason for bringing science into the co-design effort.

Benefits of joining Marine Life 2030 include contributing to a global effort to address community needs for marine life information; leveraging resources and best practices for sharing knowledge; linking natural and social sciences to answer local to global policy questions; mentoring diverse and early-career researchers; and finding solutions to problems of concern to humanity.

This strategy is attracting the support of national and international organizations, who are also providing core leadership in the co-design of Marine Life 2030. These include the US Integrated Ocean Observing System (IOOS) and other regional members of the Global Ocean Observing System (GOOS), the Marine Biodiversity Observation Network (MBON), Smithsonian Institution, UNEP World Conservation and Monitoring Centre (UNEP-WCMC), Ocean Biodiversity Information System (OBIS), Ocean Best Practices System (OBPS), Group on Earth Observations (GEO), the Future Earth Ocean Knowledge Action Network (Ocean KAN), and the Partnership for Observation of the Global Ocean (POGO) Biological Observations Working Group. But the success of Marine Life 2030 will require truly global engagement, so we welcome new multi-sector collaborators in the Ocean Decade. Sponsors are needed to help manage Marine Life 2030 programmes and the linkages to other Ocean Decade actions, including building local capacity worldwide, fostering new and low-cost technology to generate science-quality observations in all regions, selecting projects that can participate effectively, and promoting case studies that advance the application of knowledge about marine life to meet sustainable development and conservation goals.

Many partners agree to participate because they see an opportunity to collaborate in which our joint impact will be much greater than the sum of our individual contributions, and because the co-design process does not require that each group openly share all observations or intellectual property but just what is needed to solve problems that are common to many people.

This co-design process is not prescriptive and outcomes are not completely predictable. Tracking success of the co-design process can begin with metrics proposed by the Group on Earth Observations (GEO). These encompass feasibility, development, testing, deployment, and number of products and users. Yet metrics need to be developed to monitor uptake of outputs and the satisfaction of users, ease of use and applicability for products, and time taken to implement revisions to the products based on feedback. Enduring impact will be evaluated by the success of capacity building efforts at the individual level (difficult to measure), the delivery of services, including total volume of data available for research and other uses, and the uptake in core metrics used by national and international organizations to monitor and manage the ocean. Ultimately, the success of Marine Life 2030 and of the Ocean Decade will be judged by society's acknowledgment of the contributions of these programmes to an improved ocean and the people who depend on it.

Conflict of interest statement

None of the authors have competing interests that are in conflict with the article or its content.

Author contributions

MK wrote the draft of the manuscript. All other authors also reviewed and edited the manuscript for clarity, content, accuracy, and legibility.

Data availability statement

There are no new data associated with this article.

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