



EuroGOOS
European Global Ocean
Observing System

Ocean Literacy

in European Oceanographic Agencies

EuroGOOS recommendations for
the UN Decade of Ocean Science for Sustainable
Development 2021-2030

EuroGOOS Policy Brief



EuroGOOS – European Global Ocean Observing System

EuroGOOS is an association of national oceanographic institutes, hydrographic agencies, meteorological offices, and foundations, operating within the Global Ocean Observing System (GOOS) coordinated by the Intergovernmental Oceanographic Commission of UNESCO.

www.eurogoos.eu

Authors: Dina Eparkhina (EuroGOOS), Angela Pomaro (CNR, Italy), Panayota Koulouri (HCMR, Greece), Elisa Banchi and Donata Canu (OGS, Italy), Maria C. Uyarra (AZTI, Spain), Noirin Burke (Irish Ocean Literacy Network).

Contributors: Paola Agostini (CMCC, Italy), Mari Carmen García (IEO, Spain), Ana Aguiar (Met Office, UK), Carolina Alonso (AZTI tecnalia, Spain), Verónica Ortiz, Rosa Rodríguez and Lúcia Ribot (SOCIB, Spain), Elena Giusta (ISPRA, Italy), Marina Locritani (INGV, Italy), Sheila Byrnes (Marine Institute, Ireland), Emanuela Rusciano (OceanOPS), Claire Gourcuff (Euro-Argo ERIC).

Reviewed by EuroGOOS Member Organizations, April 2021

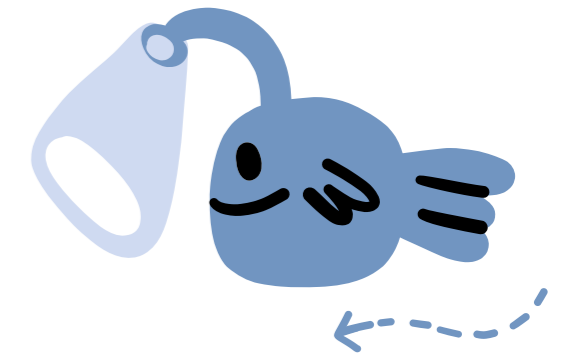
Photography: All images are credited to their owners with references next to the images. Front cover image courtesy of Dina Eparkhina.

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<http://eurogoos.eu/publications/>

Right: The winners of 'The Sea of Science' contest, third edition, launching the rosette and sampling seawater from the R/V SOCIB, 2019. Credit: 'LA MAR DE CIENCIA' (SOCIB/CSIC).





We all rely on the ocean, whether we live near it or far away. But how well are citizens aware of the state of the ocean and of its environmental, economic, political, medical, and cultural importance?

The essence of Ocean Literacy is knowing and understanding the ocean's influence on us and our influence on the ocean, as a pivotal concept for living and acting sustainably. Ocean Literacy helps to raise citizens' awareness and gives us tools to make responsible decisions in terms of our environmental impacts, public policies, and maritime activities.

Ocean Literacy connects all sectors of society. It demonstrates the value of ocean science for sustainable economy and policy, helping to create a common baseline of understanding, and a common set of values. This is critical for stakeholders who jointly address complex issues characterizing the marine environment and support decisions on responsible environmental management and sustainable blue economy.

OCEAN LITERACY

and Ocean Observing – a Win-Win Deal

Above: *Walking (The) Trajectories: Venice as a model for the future?, CNR-ISMAR & Ocean Space, Venezia, 2020. Credit: Alice Ongaro Sartori.*

Right: *Topographic map of San Sebastian coast in Spain. Credit: AZTI.*





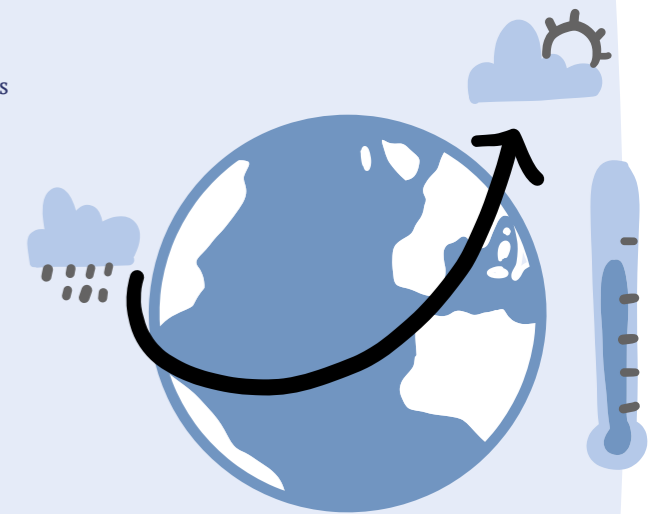
International OCEAN LITERACY Framework

The international Ocean Literacy framework includes seven principles representing key concepts about the ocean and its importance¹.

Ocean Literacy principles:

1. The Earth has one big ocean with many features.
2. The ocean and life in the ocean shape the features of Earth.
3. The ocean is a major influence on weather and climate.
4. The ocean made the Earth habitable.
5. The ocean supports a great diversity of life and ecosystems.
6. The ocean and humans are inextricably interconnected.
7. The ocean is largely unexplored.

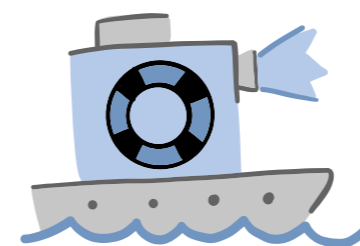
Developed in the early 2000s through the work facilitated by the US College of Exploration, the Ocean Literacy framework has since been embraced by various scientific sectors in oceanography and marine research. The United Nations Decade of Ocean Science for Sustainable Development 2021-2030, implemented by the Intergovernmental Oceanographic Commission of UNESCO, put forward Ocean Literacy as an enabler for engaging with stakeholders and determining common understanding and joint identification of solutions towards sustainability. In addition to strengthening dialogue and engagement at science-policy interfaces, Ocean Literacy also helps reach out to sectors and disciplines outside of the traditional domains of marine sciences or maritime economy and management, from art and culture to sport and recreation.



Above: Ocean Literacy session organized by the Italian National Institute of Oceanography and Applied Geophysics (OGS) at Trieste NEXT Science Festival in 2020. Credit: OGS.

Bottom: High school students visiting the Ocean Lab at the Euro-Mediterranean Center on Climate Change (CMCC) in Lecce, Italy. Credit: Paola Agostini/CMCC.

This policy brief emphasises Ocean Literacy as a strategic activity area in oceanography. The success of the United Nations Decade of Ocean Science for Sustainable Development 2021-2030 will rely on sustained and fit-for-purpose ocean observing and derived oceanographic information and services. Ocean Literacy tools and approaches are needed to increase societal and policy awareness of the needs, challenges, and opportunities of the ocean observing enterprise. Ocean Literacy is also important for achieving sustained operations and funding of the ocean observing systems, maintained predominantly by public funding.



From local and national to global levels, Ocean Literacy enables science to engage with policy and society on the topics of ocean sustainability, observations and research, and the importance of oceanography. Advocacy is a key objective in the Global Ocean Observing System 2030 Strategy with Ocean Literacy being part of this portfolio. Likewise, Ocean Literacy holds a prominent part in the EuroGOOS 2030 Strategy under several objectives, including a dedicated objective to 'Mobilise the public on the

importance of the ocean and oceanographic services¹.

In the context of the EuroGOOS work, Ocean Literacy helps connect scientists with citizens directly rather than just through reports and conferences. This includes awareness raising and engagement in local communities, schools, working places, and hospitals or opening the doors of laboratories and research centres for the public to discover what takes place behind the scenes in research activities and meet the inspirational scientists behind the work.

Fostering citizens' experiences, widening knowledge, and broadening perspectives around ocean science and sustainable development are crucial for making regulatory policies more robust, effective, and trusted. New approaches to co-design and co-production of Ocean Literacy activities offer unprecedented opportunities. These include open data acquisition and visualization tools, as well as multi-sector partnerships among stakeholders from science, education, government, business, culture, and recreation.

¹ Ocean Literacy: The Essential Principles and Fundamental Concepts of Ocean Sciences for Learners of All Ages <https://www.coexploration.org/oceanliteracy/documents/OceanLitChart.pdf>



EuroGOOS

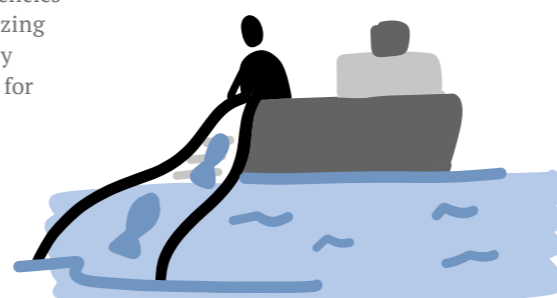
OCEAN LITERACY NETWORK

For our community, the ocean is not only our passion but also part of our daily work. EuroGOOS brings together European oceanographic institutes, meteorological offices, hydrographic agencies, and foundations. These organizations document real-time changes in ocean conditions, help to predict the weather, study the climate, and plan maritime activities. EuroGOOS members also engage with citizens in their communities, regions, and countries on the importance of the ocean and ocean research.

The activities of the EuroGOOS Ocean Literacy Network help place citizens at the heart of the ocean observing enterprise, empower oceanographers and meteorologists as ocean stewards, and increase public involvement in ocean science, gaining new advocates.

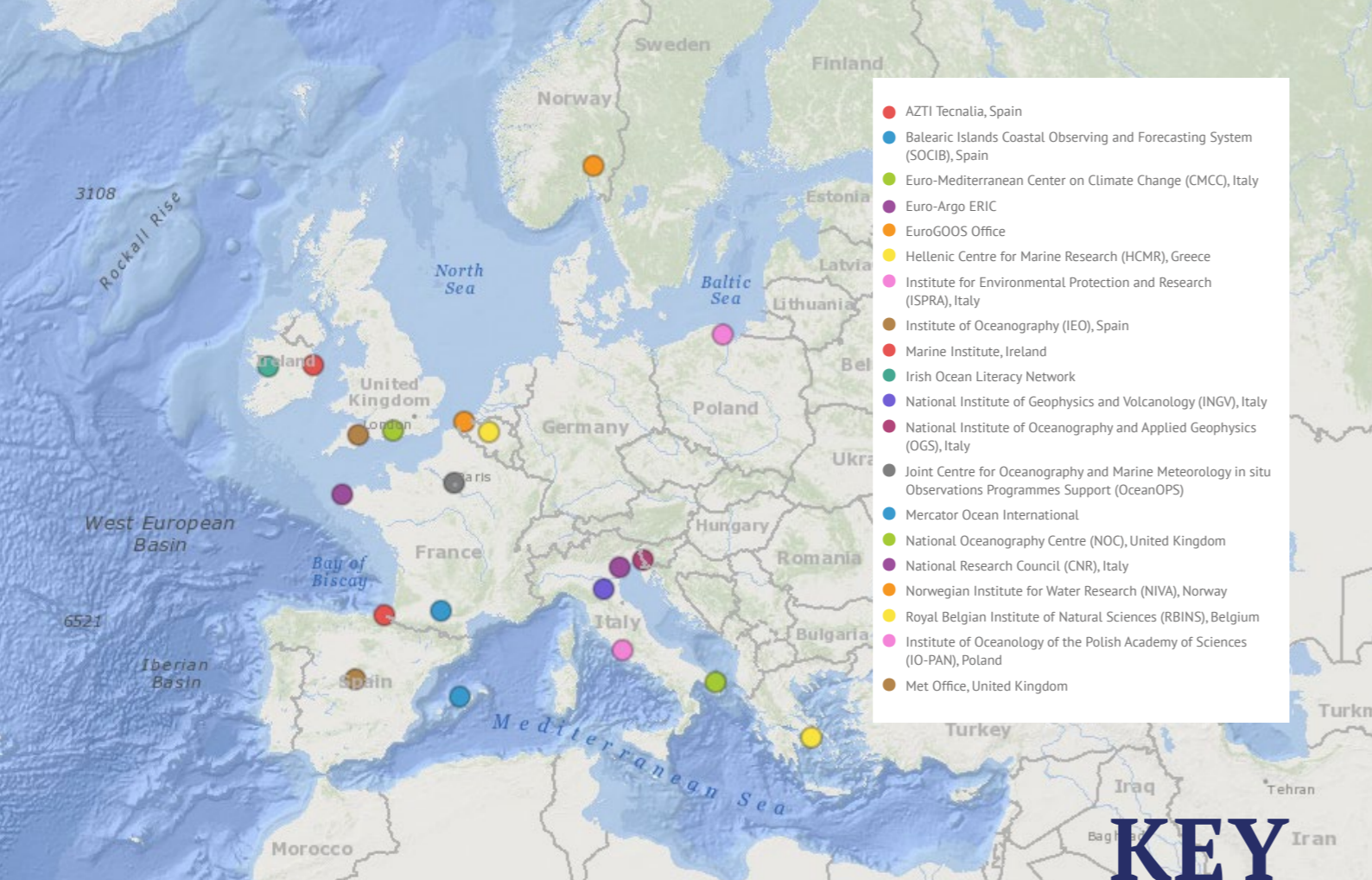
While twenty organizations are already part of the Network, it continues to grow to include more EuroGOOS members and other European and international partners. Operating since June 2019, the Network helps members exchange best practices, co-design activities, and jointly contribute to international projects and events.

The EuroGOOS Ocean Literacy Network fills a niche currently existing within the area of oceanographic and meteorological research. It upscales the efforts of publicly-funded oceanographic and meteorological agencies as ocean stewards for society, recognizing the importance of their Ocean Literacy work, and creating new opportunities for partnerships.



Exhibition 'We and the Plastic' held at the Museum of Natural History of the University of Pisa (UNIP), Italy, and realized in collaboration with INGV and CNR-ISMAR. The Vitruvian Man by Leonardo da Vinci (top right), that in our imagination represents harmony, has been transformed into a plastic statue by artist Lorenzo Possenti using the plastic waste collected by the Museum staff, to make the visitors reflect on the risk that pollution represents for our present and, above all, for our future. Credit: UNIP.





KEY ACTIVITIES

JUNE 2019 – APRIL 2021

1. Organizations: 16 National; 4 Pan-European or international. Experts contributing to the Network: 23 Female, 4 Male.
2. Ocean Literacy resources library on EuroGOOS website.
3. Ocean Literacy demonstration at the OceanObs'19 exhibition by EuroGOOS Ocean Literacy Network member AZTI, Spain.
4. EuroGOOS contribution to the IOC training on Ocean Literacy via the OceanTeacher Global Academy, February 2021.
5. EuroGOOS Ocean Literacy poster at OceanObs'19.
6. Contribution of materials for the resource pages of the 1st UNESCO Ocean Literacy Virtual Summit (EuroGOOS was co-organizer of the Summit).
7. Home-schooling Ocean Literacy Twitter campaign during the COVID-19 pandemic lockdown in Spring 2020.
8. Examples of results of the survey of 11 organizational responses on European Ocean Literacy in oceanography as of December 2020; Policy-oriented brief with main messages and recommendations launched in May 2021.
9. Workshop on Ocean Literacy Accessibility to All at international ocean science communication conference CommOCEAN in December 2020 with keynote from TBA-21-Academy's Ocean Space.



"THE SEA OF SCIENCE": A SUCCESS STORY

A multimedia artwork, video, and storytelling online content aimed at primary and secondary school students

2,899	598	209	2,159	3	330,000	120,000
Students	Schools	Teachers	Submitted works	Editors & Task cards	Work cards	Work cards

SeaCleaner

A citizen science project to monitoring beached marine litter aimed at volunteers and school students

1500	6	44	26,486	34,027	2	23
Students	Teachers	Volunteers	Beach litter removed	Marine litter identified	Documents	Beach litter photos

OCEAN LITERACY

A STRATEGIC ENABLER OF AN EFFECTIVE INTERFACE BETWEEN OCEANOGRAPHY, POLICY AND SOCIETY

We all rely on the ocean, whether we live near it or far away. How can we communicate the benefits and value of ocean observing to funders, policy, and society?

Cross-cutting priority for the Ocean Decade

Ocean Literacy has been recognized as a strategic enabler to engaging with policy and society on the topics of ocean sustainability, ocean observations, and the use of oceanographic products and services. Ocean Literacy is a cross-cutting priority area in the UN Decade of Ocean Science for Sustainable Development 2021-2030.

Ocean Observing and Ocean Literacy - a win-win deal

Whether your interlocutor is a funder, a policymaker, or a water-for-purpose ocean observing, increased societal and policy awareness of the needs, challenges and opportunities of ocean observing will not be possible without the Ocean Literacy tools and approaches.

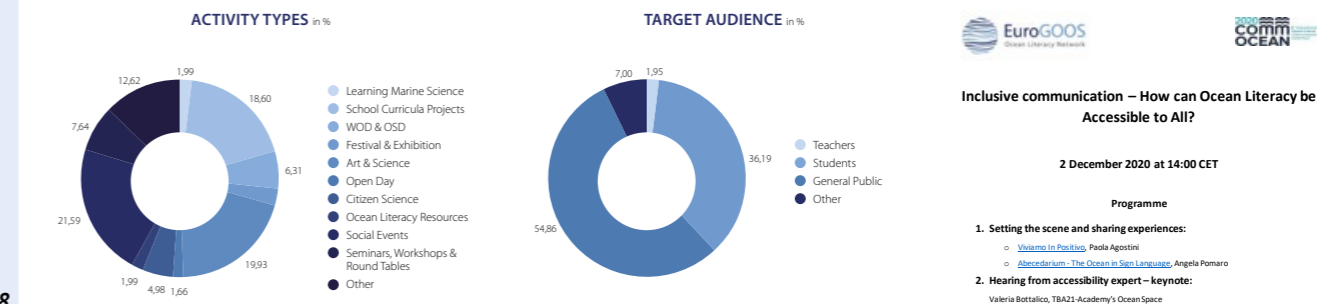
OCEANS DAY 2020

VIRTUAL OCEAN LITERACY SUMMIT

8 June 2020
09:00am - 12:00 pm UTC
Virtual Event

Our #OceanLiteracy experts have united to make your #homeschooling more fun!

Follow #EuroGOOS_OL to dive into our multi-lingual resources!



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Left: Presentation of educational programmes 2020-2021 in collaboration with CNR, Ocean Space, Venice, 2020. Credit: Arianna Ferraretto.

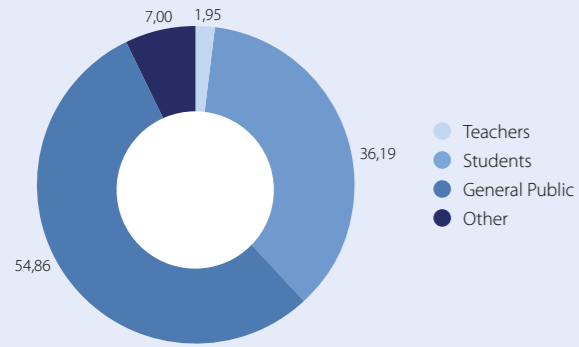
Page left: School visit to the seaside organized in collaboration with ISPRA, Italy, in 2019. Credit: Luisa Nicoletti.

Right: Activities on 11 February 2019, International Day of Women and Girls in Science, at the Oceanographic Center of Malaga, Spain. Credit: IEO.

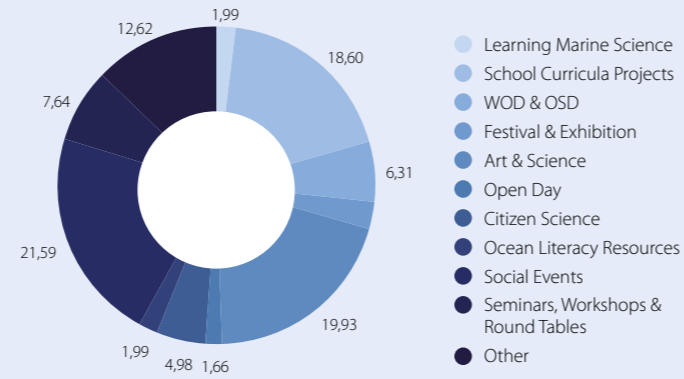


Bottom: Explorers Education Programme from the Marine Institute Ireland at Galway Science and Technology Festival 2019. Credit: Garry Kendellen.

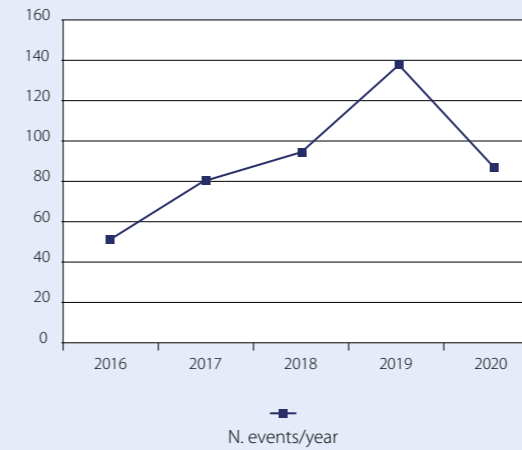
TARGET AUDIENCE in %



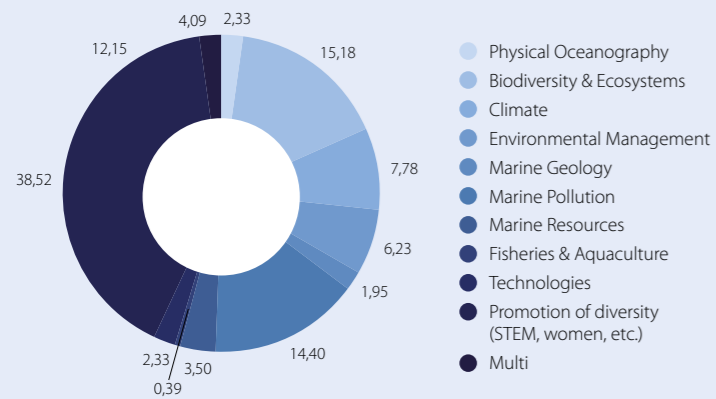
ACTIVITY TYPES in %



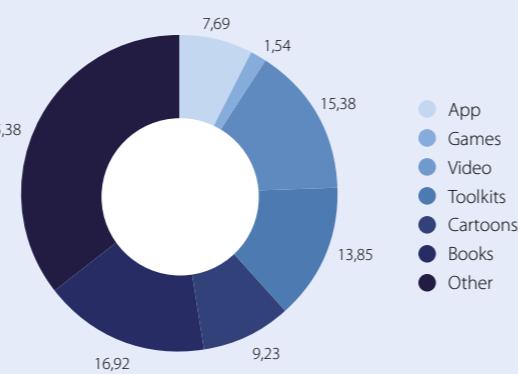
N. EVENTS/YEAR



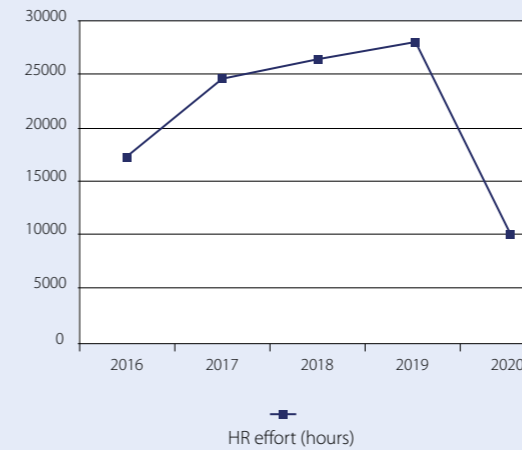
TOPICS in %



OCEAN LITERACY RESOURCE TYPE in %



HR EFFORT (hours)



Key results of the EuroGOOS Ocean Literacy survey

Key results are presented through graphs and key messages and recommendations.

The 11 organizations who participated represent national oceanographic institutes or meteorological offices, as well as two pan-European organizations, and one global programme (full list of the EuroGOOS Ocean Literacy Network participants can be seen in the annex). The survey highlighted 300 activities in public engagement and Ocean Literacy during five years of operations.

The scope of the survey included the activities tailored for the public including all ages, teachers, students, etc. The survey did not consider activities linked to stakeholder co-design or consultation (e.g. workshops for fishers or info-days for the users of oceanographic products).

SPOTLIGHT

on oceanographic and meteorological agencies as Ocean Literacy advocates

A survey of national Ocean Literacy activities carried out by the members of our Network was conducted between July 2019 and December 2020, based on five years of operations. The results displayed 300 activities across 11 organizations, showing an outstanding diversity of approaches. These included multi-annual programmes,

experimental projects combining efforts from different disciplines, festivals and competitions, school workshops, and the production of books, films, artworks, and games. Topics ranged from biodiversity, to pollution, environmental management, blue economy, climate, technology, and promotion of gender balance and diversity.

Right: Citizen science activities during the SeaCleaner project. Credit: Marina Locritani.





Creations of the finalists of 'The Sea of Science' contest in 2016 (first edition). Credit: 'LA MAR DE CIENCIA' (SOCIB/CSIC).

KEY MESSAGES

and RECOMMENDATIONS



Key messages and recommendations towards improving Ocean Literacy activities in European oceanographic and meteorological agencies and increasing their impact are presented in the following pages. Our survey demonstrated how Europe is advancing in making Ocean Literacy part of the mandate of oceanographic agencies and meteorological offices. What began as an assumption of the importance and scale of Ocean Literacy activities in the EuroGOOS community, turned out to be a growing priority among our members and partners.

The extent of the activities dedicated to increasing public engagement and awareness carried out by these organizations, whose core mandate is mainly linked to scientific and technological aspects of ocean data and services, calls for a stronger voice for Ocean Literacy as a recognised and active force in today's science. Ocean Literacy holds many opportunities for oceanography. Showcasing and connecting the variety of competences in this field helps to strengthen Ocean Literacy as an important aspect of the work of the ocean science institutions in the UN Decade of Ocean Science for Sustainable Development 2021-2030.

Addressing the 'COVID-19 GAP' in activities

Responding to the challenges of the pandemic, the EuroGOOS Ocean Literacy Network strengthened its online activities. We ran a 'home-schooling' social media campaign to bring attention to the digital Ocean Literacy resources from the Network. Those included videos, games, books, colouring pages, or infographics that children and adults could use at home in Spring 2020. Furthermore, the Network contributed over 80 items of digital content to the First Virtual Ocean Literacy Summit led by IOC-UNESCO and co-organized with EuroGOOS, OceanWise, and Experimental Atelier on World Ocean Day 2020 on 8 June. The Network also organized a workshop on accessibility in Ocean Literacy at the international ocean science communication conference CommOCEAN, which took place as a virtual event in December 2020. In February 2021, the Network contributed to the IOC OceanTeacher Global Academy's on-line training on Ocean Literacy.



OCEAN LITERACY

activities help connect marine research with education, policy, economy, and society.

1

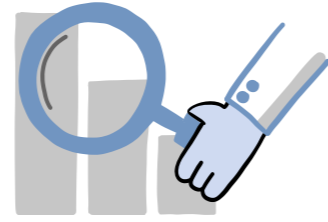
Ocean Literacy is broad and versatile, it offers publicly funded oceanographic and meteorological agencies a range of opportunities to engage with diverse audiences across generations as well as professional and socio-economic roles.

Positive feedback about the activities featured in our survey did not only come from the public involved but also from the scientists or co-developers of the programmes themselves (e.g., teachers or artists). This demonstrates an intrinsic potential of Ocean Literacy activities to connect with audiences in intellectual, emotional, and creative ways, helping to link the activities to different sectors of society.

Left: Fishing vessel collecting marine litter as part of the LIFE LEMA project. Credit: DFG.

The survey shows, however, that this potential has not been fully exploited. More Ocean Literacy activities should be organized for economic and political actors, in addition to the activities already ongoing for education and the public.





IMPACT MONITORING

of Ocean Literacy activities is required to fully assess the benefits of these activities.

Dedicated impact monitoring should be carried out to ensure the effectiveness of activities, with the goal of creating long-term impacts. Those can include surveys, testimonials, key performance indicators, and statistical analysis. Impact monitoring should also investigate spillover effects, whereby an activity addressing one target group has an influence on a secondary audience. While this may be hard to track, it represents an important element of the work being carried out, and the ability of a programme to create a snowball effect, fostering intergenerational and multi-sector Ocean Literacy.

Working with children may also influence teachers, families, and friends; while working with policymakers may influence how scientists perceive decision making processes, contributing to strengthening the science-policy interface. Another important effect of Ocean Literacy is a potential to promote blue careers and inter-disciplinarity across stakeholder groups.

Ocean Literacy should also constitute a recognized component of the work of the oceanographic and meteorological agencies funded by public resources, bearing in mind that all the activities featured in our survey were free of charge and all digital resources were open access.

Right: Science Fair in Bezmiliana, Malaga, Spain. Credit: MCarmen Garcia.





OCEAN LITERACY

should be recognized as a significant action, and a research field in oceanography, with an adequate funding support.

3

In view of its importance in the context of the UN Decade of Ocean Science for Sustainable Development 2021-2030, Ocean Literacy should be allocated dedicated resources and adequate support. Currently, most efforts surveyed were either in-kind or short-term projects, lacking dedicated key performance indicators and placement in organizational work programmes. Increasing resources for Ocean Literacy activities and relevant research will allow improved monitoring of impact and expansion in reach.

Ocean Literacy activities will benefit from contributions from professional communicators and creators of outreach materials and collaborations with humanities and social scientists.

By generating appropriate support towards Ocean Literacy, the design of the activities will be improved, as well as the monitoring of their impact, while new professional opportunities will attract more diverse and multi-disciplinary workforce to the oceanographic and meteorological agencies.



Left: Winners of 'The Sea of Science' contest and their relatives on board R/V SOCIB visiting the SOCIB buoy installed in Palma bay, 2019. Credit: 'LA MAR DE CIENCIA' (SOCIB/CSIC).



4 PARTNERSHIPS

with professionals in other disciplines will give better results.

Engagement with disciplines not traditionally represented in oceanographic and meteorological agencies will improve the Ocean Literacy offer. The lack of adequate funding and personnel time allocated to tasks make it challenging to fully reach the potential of many of the activities featured in the survey. Contributions from professionals in communications, education, social sciences, humanities, and art, will benefit the activities and improve their impact.

Partnerships with a broad range of disciplines will be another important contributor to the co-design of the Ocean Literacy activities for audiences. Making the Ocean Literacy offer more appealing and multi-faceted will also allow it to be more easily re-used and re-purposed. Partnerships will improve the exchange of materials, ensure best practices, and facilitate the sharing of innovative tools between organizations and countries.

Right: Messy Studio, Ocean Space, Venezia, 2020. TBA21 – Academy. Credit: Enrico Fiorese.



Global Ocean Observing System -
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COLLABORATIONS

among Ocean Literacy practitioners
are key to strengthen the European capacity
and empower practitioners in their work.

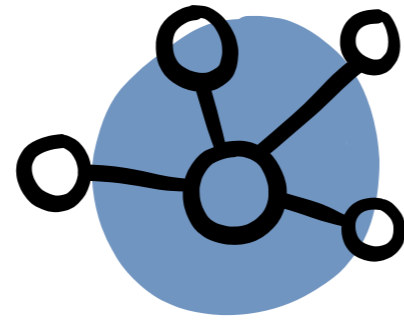
The creation of the EuroGOOS Ocean Literacy Network has been seen by its members as a strong accelerator of their pan-European remit. The national and regional Ocean Literacy activities by the EuroGOOS members and partners were shared and highlighted through our Network, creating a vibrant forum for the exchange of ideas, mutual support, international recognition, and joint activities.

Left: EuroGOOS Member Organization representatives at the EuroGOOS stand at OceanObs'19. Credit: Dina Eparkhina.

In addition to the pan-European collaboration, our Network calls for stronger synergies and exchanges within nations. In strengthening national Ocean Literacy capacities, it is key to focus on both coastal and non-coastal areas. Digital and internet technologies are an important asset in this respect.

Ocean Literacy practitioners and researchers should collaborate on the creation of re-producible and customized materials, kits, and activity plans, which can be used in different countries and easily adapted to the specific needs of diverse audiences.





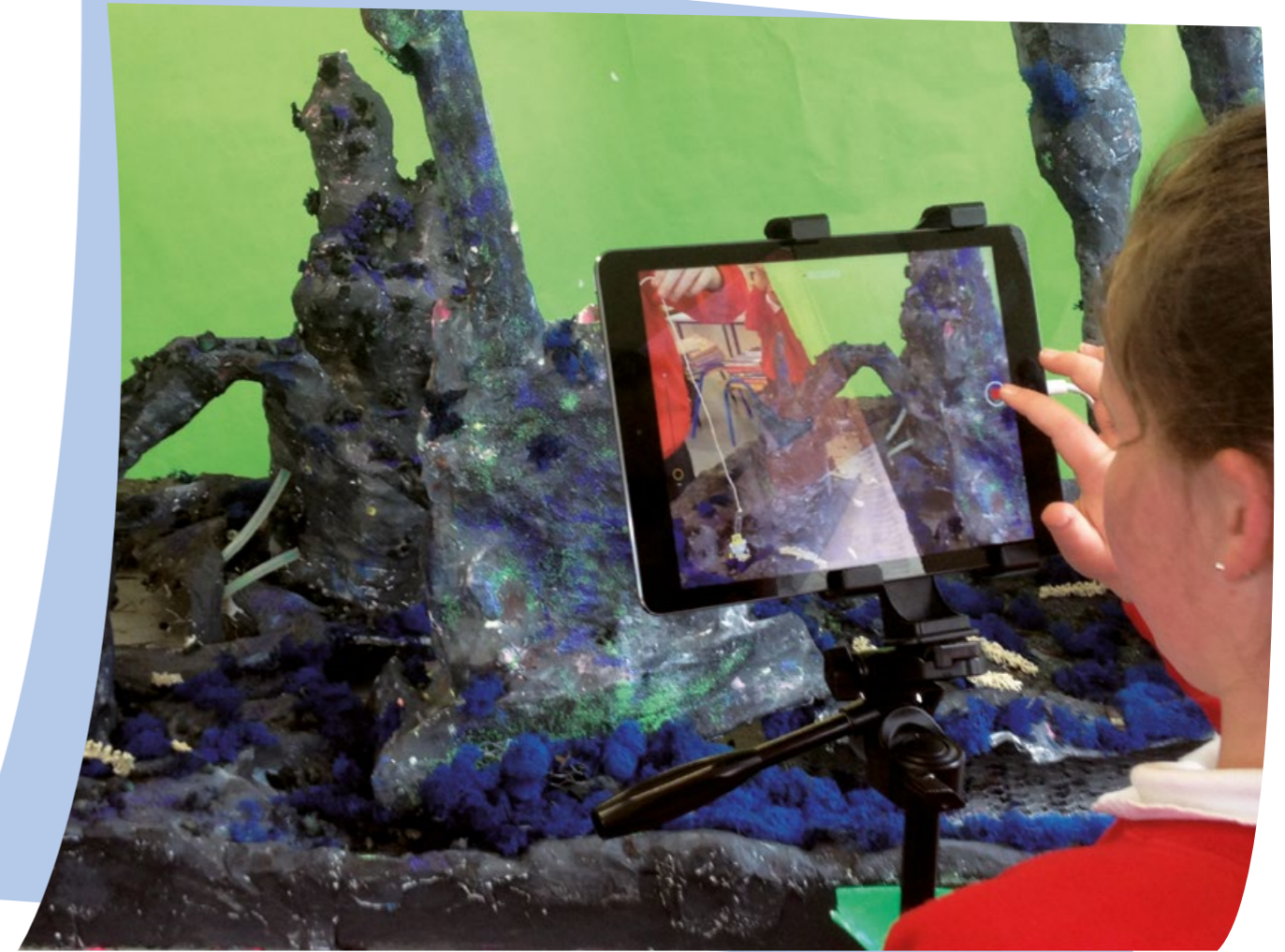
OCEAN LITERACY

activities should strive to be inclusive and accessible to all.

Ocean Literacy has evolved from informal education to an enabler of sustainable oceanographic activities and science-based decision and policymaking. The opportunities offered by Ocean Literacy should continue to embrace the societal needs and values of inclusiveness, accessibility, and equity. Our survey demonstrated a lack of activities for people in unique environments such as hospitals, prisons, or people suffering from physical disabilities. It is important to focus on Ocean Literacy resources accessible to all and adaptable for all audiences, building partnerships with professionals in education, social services, medical sciences, art, and data visualization.

Ocean Literacy activities should not only strive to be more accessible, but also consider new settings, far from research institutions or the coast, where most activities are currently taking place. Furthermore, Ocean Literacy should also strive to become part of the target audience's professional occupation, not only something for free and family time. Activities should be developed that can be incorporated into work life and professional environments (e.g., businesses and public administrations).

We will need to increase the number of Ocean Literacy facilitators to promote this expansion. For example, in the education sector, while many activities target children, it is important to also engage with teachers, both in terms of their own Ocean Literacy and in co-designing activities for children. Engaging with public figures and influencers should also be done to increase the reach and impact of the Ocean Literacy activities.



Sustainable blue economy and the challenges and opportunities of the European Green Deal should get a stronger focus in the Ocean Literacy activities in oceanography. Most activities in our survey deal with the environmental aspects. There is currently a lack of activities raising awareness of the blue economy and its context within with the Ocean Literacy principles.

The opportunities that digitalization offers to spread Ocean Literacy throughout our society should be acknowledged. Online resources and outlets, gaming, applications, and live online classes should receive adequate support to make

them professional Ocean Literacy deliverables. With the increased opportunities and technological progress of digitalization, it will also be important to strengthen hands-on activities as part of Ocean Literacy, through citizen science, design and make, investigations, and field activities.

Above Marine Institute, Ireland, Explorers Educational Programme 'Build your own unknown project'. Credit: Marine Institute.

ANNEX

List of organizations and experts taking part in the EuroGOOS Ocean Literacy Network

- AZTI tecnalía, Spain – Carolina Alonso
- Balearic Islands Coastal Observing and Forecasting System (SOCIB), Spain – Verónica Ortiz, Rosa Rodríguez, and Llúcia Ribot
- Euro-Argo / Ocean Observers Working Group – Claire Gourcuff
- Euro-Mediterranean Center on Climate Change (CMCC), Italy – Paola Agostini
- Hellenic Centre for Marine Research (HCMR), Greece – Panayota Koulouri
- Institute for Environmental Protection and Research (ISPRA), Italy – Elena Giusta
- Institute of Oceanography (IEO), Spain – Mari Carmen García
- Institute of Oceanology of the Polish Academy of Sciences (IO-PAN), Poland
- Irish Ocean Literacy Network, Ireland – Noirin Burke
- Joint Centre for Oceanography and Marine Meteorology in situ Observations Programmes Support (OceanOPS) / Ocean Observers Working Group – Emanuela Rusciano
- Marine Institute, Ireland – Cushla Dromgool-Regan (Camden Education Trust, on behalf of Marine Institute, Ireland) and Sheila Byrnes
- Mercator Ocean International – Fabrice Messal
- Met Office, United Kingdom – Ana Aguiar
- National Institute of Geophysics and Volcanology (INGV), Italy – Simona Simoncelli, Marina Locritani, and Antonio Guarnieri
- National Institute of Oceanography and Applied Geophysics (OGS), Italy – Donata Canu, Elisa Banchi, and Francesca Malfatti
- National Oceanography Centre (NOC), UK – Lucy Cox (until February 2021)
- National Research Council (CNR), Italy – Angela Pomaro
- Norwegian Institute for Water Research (NIVA), Norway – Kai Sørensen and Anna Birgitta Ledang
- Royal Belgian Institute of Natural Sciences (RBINS), Belgium – Kelle Moreau
- Network coordinator: Dina Eparkhina, EuroGOOS Office



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