OCEAN LITERACY

The Essential Principles and Fundamental Concepts of Ocean Sciences for Learners of All Ages

VERSION 2: MARCH 2013

COLLEGE OF EXPLORATION

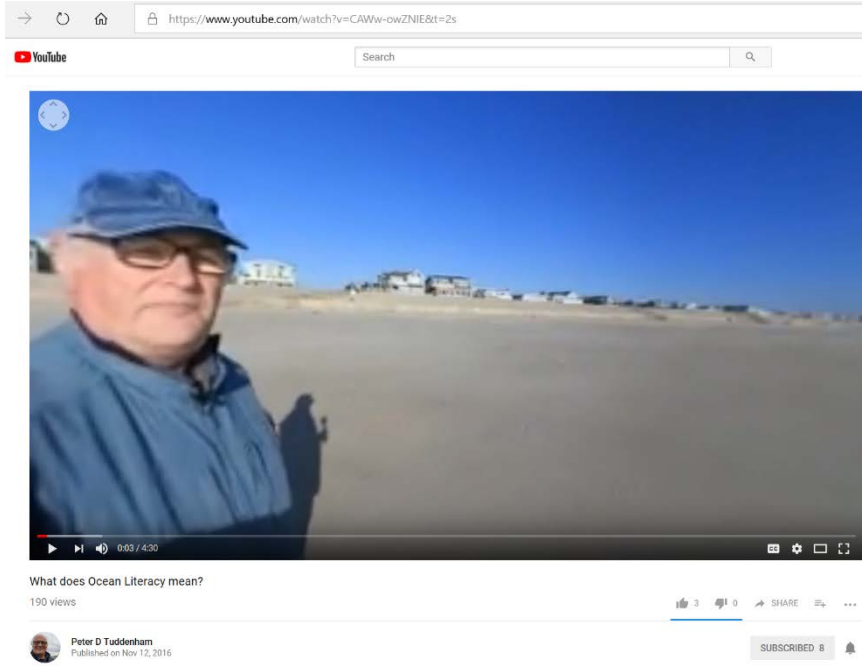
Our Future is Blue
Our Future is Ocean Literate

looking back on 20 years of an ocean literacy initiative to imagine what we can achieve in the next 20 years

Peter D Tuddenham, College of Exploration (USA &UK),
and
European Marine Science Educators Association (Belgium)

Oceanliteracy.net Oceanliteracy.eu emsea.eu
@ocean_literacy @4oceanliteracy #oceanliteracy
@peterdtuddenham

Note on Perspectives – 360 degrees
What does Ocean Literacy mean to you?



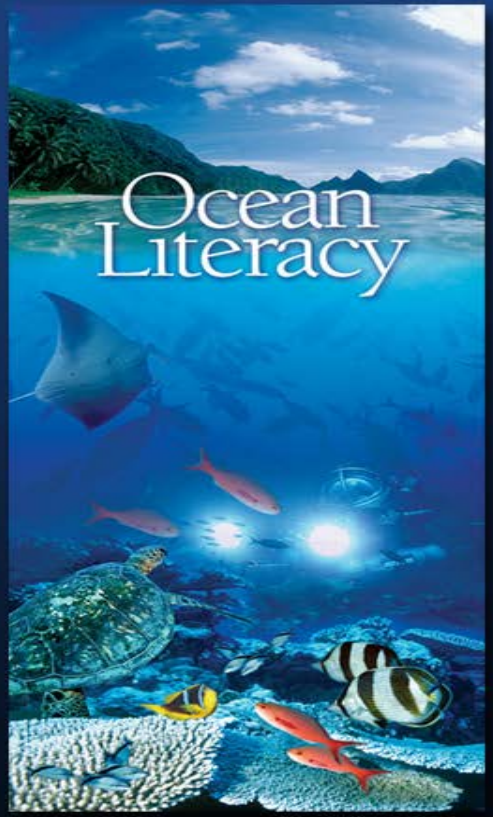
https://www.youtube.com/watch?v=CAWwowZNIE&t=3s

What is Ocean Literacy?

- a PARTICIPATIVE
- PROCESS to capture, engage, mobilize our
- PASSION as educators, scientists, ocean policy-makers, lovers of sea, for the
- PURPOSE of engaging, informing and educating the
- PUBLIC about our relation to & dependence on the ocean, considering our
- PLACE, observing where we are geographically, to provide differing
- PERSPECTIVES

Process From USA to worldwide 1998-2018

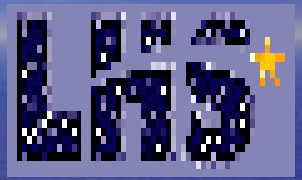
- 1969 First National Conference on Marine Science Education
- 1998 Various regional and topical efforts on Ocean Literacy started in USA to identify ocean science topics to be taught in the curriculum of geography and science
- 2004 Consensus Guide, Map ocean science topics to science standards, Definition of Ocean Literacy, 7 Principles, 44 concepts
- Scope and Sequence for USA K-12 education 700+ topics
- Ocean Literacy developed in Portugal
- First Ocean Literacy conference in Europe, Bruges 2012
- 2013 “Ocean Literacy” in the Galway Agreement
- 2014 EU H2020 Projects on Ocean Literacy – Sea Change and ResponSEAble
- 2014 1st Global Ocean Literacy Workshop – College of Exploration - Annapolis
- 2015-2017 Global Ocean Science Workshops, Rhode Island, Paris, Venice
- 2017 COSEE, College of Exploration & UNESCO side event UN Conference on Ocean New York
- 2017 UNESCO Ocean Literacy for All



The ocean is the defining feature of our planet. Ocean Literacy means understanding the ocean's influence on you and your influence on the ocean. There are 7 principles of Ocean Literacy — ideas scientists and educators agree everyone should understand about the ocean. Join the Network to build a more ocean literate society!

A Brief History of the Ocean Literacy Campaign in the USA

Acknowledgments



1996-2004 The Challenge:

- United States public largely ignorant of importance of ocean in their lives and Ocean topics did not fit neatly into current national education standards and thus were largely ignored
- Ocean scientists not involved in education
- No consensus on what was important to include in classroom

2004 The Response:

- Natl. Centers Ocean Sciences Education Excellence (COSEE), National Marine Educators Association, National Geographic, National Oceanic and Atmospheric Administration, Sea Grant, College of Exploration, Lawrence Hall of Science, and many individuals, organizations, and small groups
- An online approach coordinated by College of Exploration was developed to build consensus:
  - Inclusive, democratic, transparent process, Work mostly done online
  - Built on and credited past efforts,
  - No institutional ownership. Institutions and scientists lent authority and credibility

2005 The Result:

- Ocean literacy was defined
- Essential Principles were identified and supported by fundamental concepts
- These principles and concepts were aligned to National Science Education Standards
- An archive of this work can be seen at:

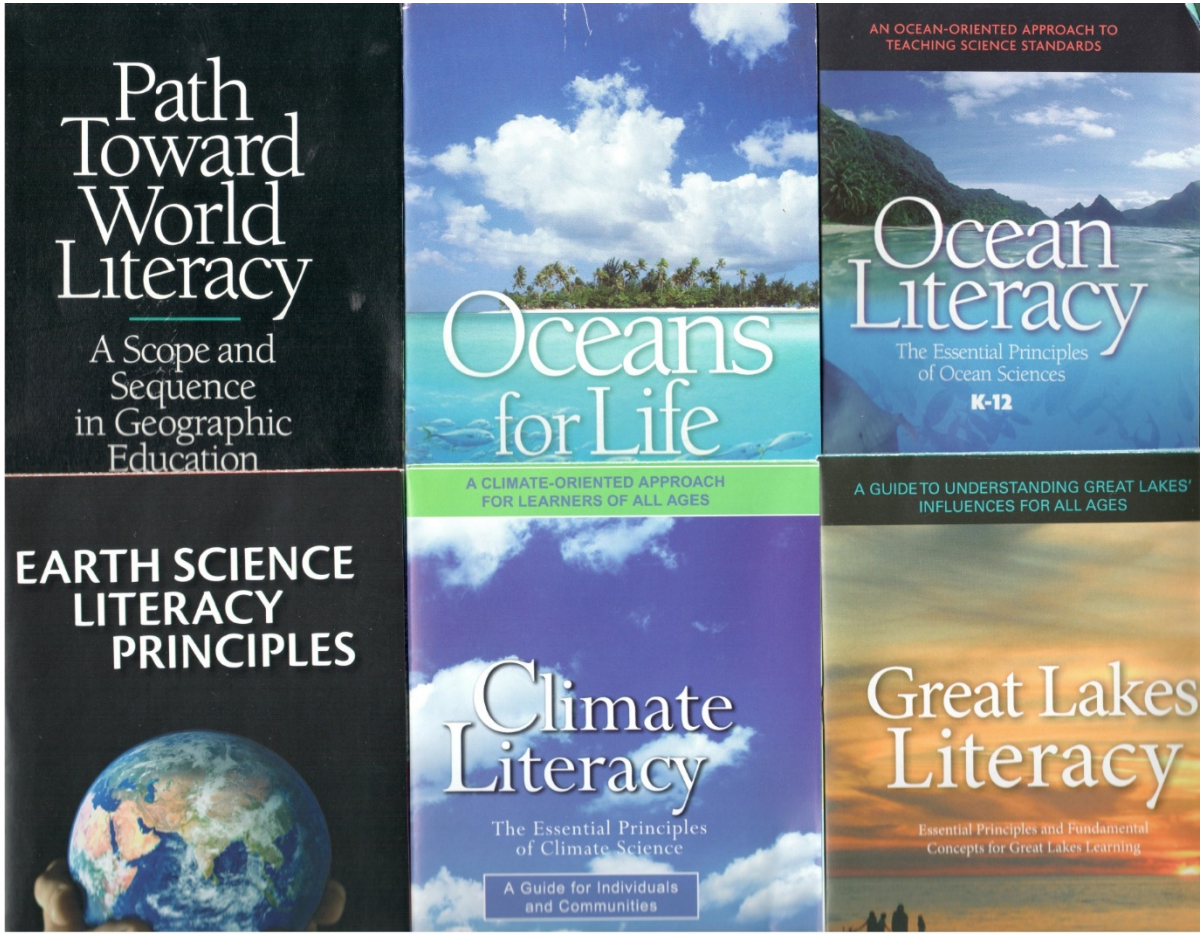
www.oceanliteracy.net

Significant Events in the Development of OLEPFC & the Scope and Sequence

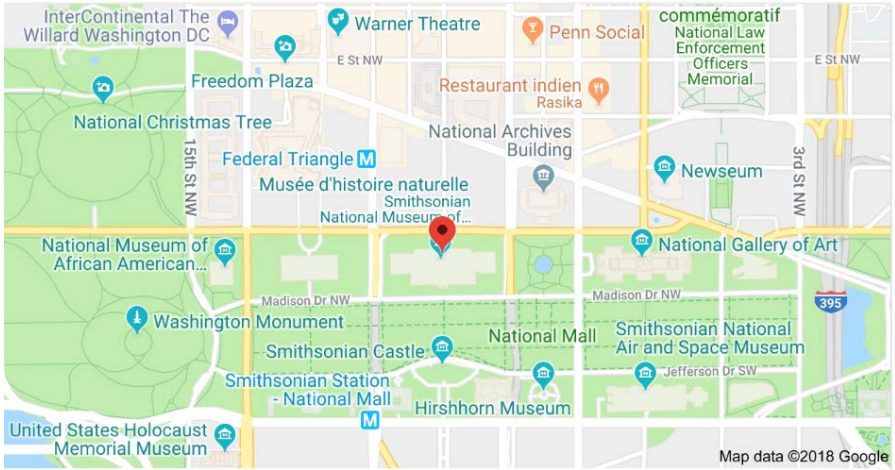
- 2002: National Geographic: *Oceans for Life* workshop
- 2003: National Marine Educators Association (NMEA)
  Ad Hoc Committee on Science Standards
- 2004: Online workshop to define Ocean Literacy
- 2005:
  - Iterative review process of draft framework and definition
  - Brochure published summer 2005
- 2006-2009:
  - Four drafts of the *Scope and Sequence* developed, reviewed, and refined at numerous in-person and virtual meetings
- 2010: publication of the *Scope and Sequence*

Ocean Literacy Campaign: Impacts

- Numerous special conferences devoted to Ocean Literacy around the world
- A model for other science literacy efforts
- Essential principles used as key messages in informal education products and programs
- Influence on content of elementary, middle and high school instructional materials on a global scale
- Influence on US state curricula (Maryland, Michigan, Florida, California) and national textbooks
- Transformation of our thinking


Path Toward World Literacy
A Scope and Sequence in Geographic Education
Oceans for Life
AN OCEAN-ORIENTED APPROACH TO TEACHING SCIENCE STANDARDS
Ocean Literacy
The Essential Principles of Ocean Sciences
K-12
EARTH SCIENCE LITERACY PRINCIPLES
A CLIMATE-ORIENTED APPROACH FOR LEARNERS OF ALL AGES
Climate Literacy
The Essential Principles of Climate Science
A Guide for Individuals and Communities
A GUIDE TO UNDERSTANDING GREAT LAKES' INFLUENCES FOR ALL AGES
Great Lakes Literacy
Essential Principles and Fundamental Concepts for Great Lakes Learning

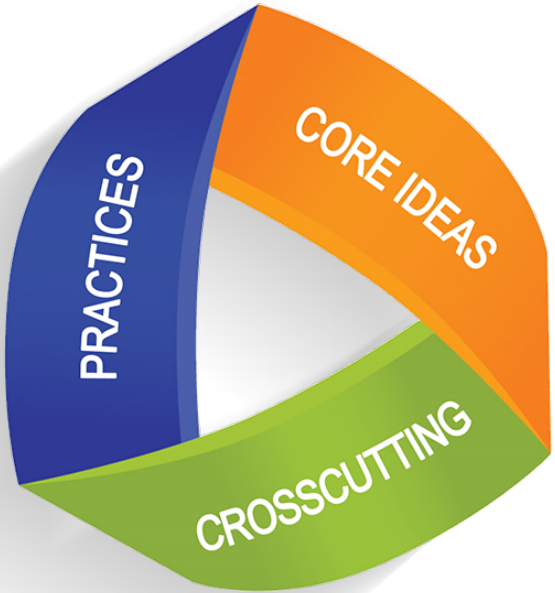
Smithsonian Sant Ocean Hall
Washington D.C.



Sant Ocean Hall
Washington, DC 20004, États-Unis

Photo from Flicker Powhusku

Influenced and Informed Development of USA Next Generation Science Standards



USA Ocean Literacy: definition

Ocean literacy is an understanding of the ocean's influence on you and your influence on the ocean.

EU H2020 Sea Change Ocean Literacy: definition

Ocean literacy is an understanding of the ocean's influence on US and OUR influence on the ocean.

USA Ocean Literacy: definition

Ocean literacy is an understanding of the ocean's influence on you and your influence on the ocean.

An ocean-literate person:

- Understands the Essential Principles and Fundamental Concepts about the ocean;
- Can communicate about the ocean in a meaningful way; and
- Is able to make informed and responsible decisions regarding the ocean and its resources.

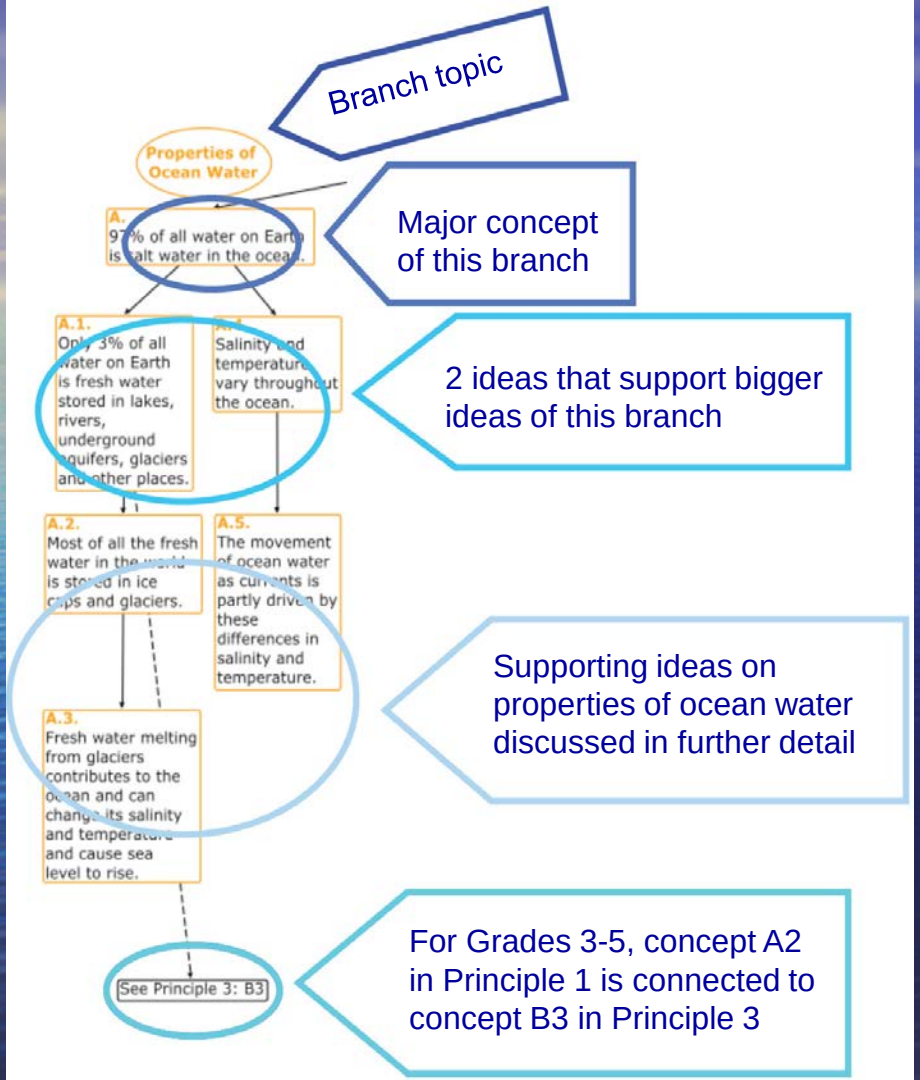
What are the most important things to know about the ocean?

Ocean Literacy 7 Essential Principles:

1. 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 makes (made) 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.

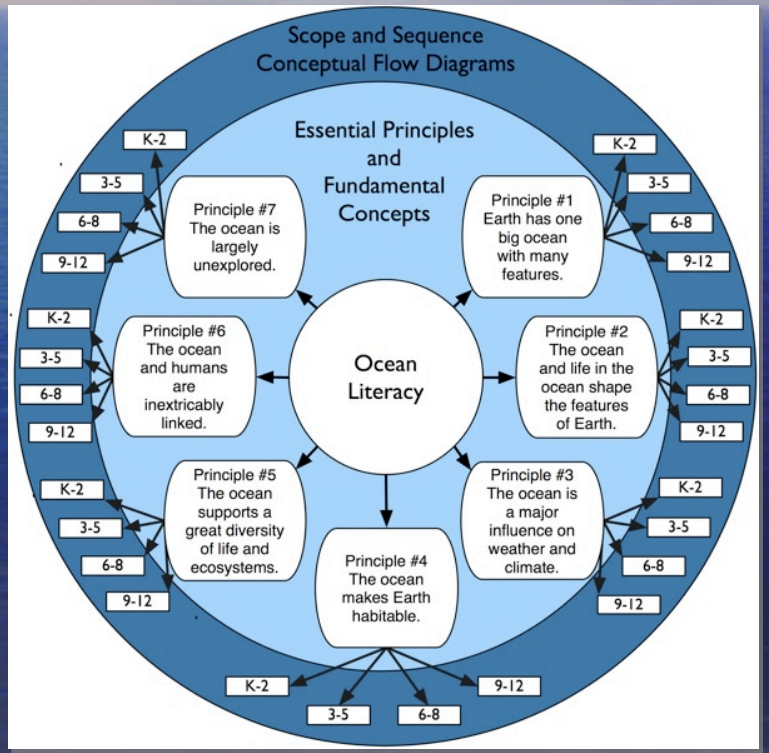
USA Ocean Literacy Scope & Sequence for Grades K-12

- If you want students to understand the OL fundamental concepts by Grade 12, what would you teach in K-2, 3-5, 6-8, 9-12?
- *Scope & Sequence:* a logical, coherent approach to building complex ideas
- Matches learning theory, cognitive science
- Addresses misconceptions

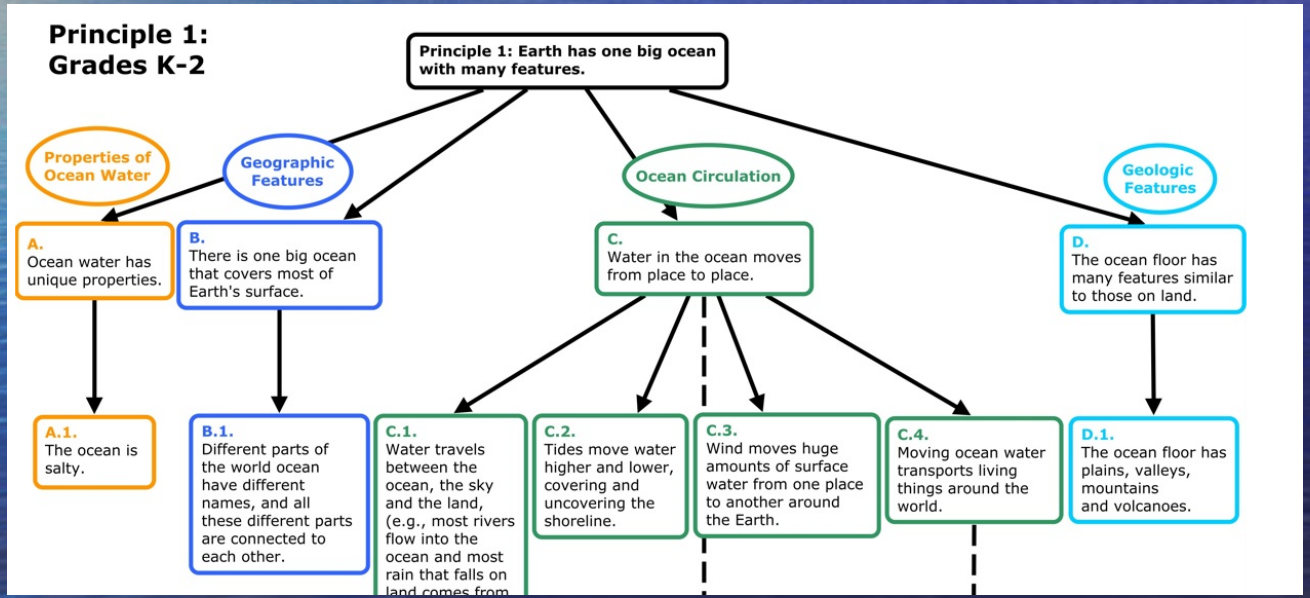


Example: Branch of a Conceptual Flow Diagram

Scope and Sequence – oceanliteracy.net



Web Pages for Conceptual Flow Diagrams for Each Principle



www.oceanliteracy.net and oceanliteracy.eu

http://www.oceanliteracy.net

“Ocean Literacy” conferences 2005-2009

- Many conferences (U.S., Australia, Japan, Chile) entirely devoted to discussing and reflecting on the Ocean Literacy Framework and/or the Ocean Literacy Campaign.
- Public Ocean Literacy (2005-Long Beach, CA)
- CoOL:Conference on Ocean Literacy (2006-Washington, DC)
- International Pacific Marine Educators Conference (2007-Maui, Hawaii; 2008-Townsville, Australia)
- New England Ocean Science Education Consortium Conference on Ocean Literacy (2007; 2008)
- Japan Ocean Literacy Symposium (2008-Tokyo, Japan)
- Primera Feria Educativa del Océano (2008-Santiago, Chile)
- Ocean Literacy Summit–Beyond the Brochure (2009-Newport, OR)

“Ocean Literacy” conferences 2009-2018

- NEOSEC Ocean Literacy Summits 2010, 2012, 2014, 2016, 2018
- First Conference on Ocean Literacy in Europe, Bruges 2012
- Words “Ocean Literacy” in Galway Agreement 2013
- TransAtlantic Ocean Literacy – Plymouth 2013, –Gothenburg 2014 - Copenhagen 2015 - Newcastle 2018
- 1st Global Ocean Literacy Workshop– Annapolis 2014
- Global Ocean Science Education Workshops, Rhode Island, 2015, Paris, May 2016, Venice May 2017
- Ocean Literacy for All – UN Conference on the Ocean June 2017,
- UNESCO Ocean Literacy for All Conference Venice December 2017

Global Ocean Literacy Activities

- USA
- Portugal
- Chile
- UK
- Japan
- Taiwan
- Europe
- Italy
- Ireland
- China
- Greece
- Bangladesh
- Canada
- Poland
- Tunisia
- Australia
- Peru
- TransAtlantic
- Pacific Marine Educators
- Great Lakes
- South Africa

Global Activities – Portugal

www.cienciaviva.pt/oceano/home/oqueeoprojeto/

conhecer oceano

ABOUT ▾ OCEAN PRINCIPLES ▾ OCEAN AND SCHOOL ▾ LINKS ▾ EN ▾

What is the project?

Conhecer o Oceano (Knowing the Ocean), a navigation chart for ocean literacy.

This project is based on the North-American initiative Ocean Literacy. This initiative resulted from a wide consultation with scientific and educational entities and identified seven Main Principles about the Ocean. These principles were then mapped into the different learning levels of the school curriculum.

Ciência Viva coordinated the adaptation of this initiative to the Portuguese reality, in collaboration with research institutes of Marine and Education Sciences.

Knowing the Ocean offers:

- Essential knowledge about marine sciences, adapted to the school curriculum;
- Educational Resources about the Ocean adapted to each learning level;
- Basic information on Portuguese Public Marine Policies;
- Basic information on research related to the Sea made in Portugal.

PROJECTOS
OSOS - Open Schools for Open Societies (2017-2020)
FITARR! - Fostering Improved Training Tools for Responsible Research & Innovation (2017-2020)
STEM School Label (2017-2020)
ERC+ScienceSquared (2015-2019)
EduCC2ocean (2016-2018)
Foresight - Noite Europeia dos Investigadores (2015-2017)
ESERO Portugal (2015-2017)
Sea Change (2015-2018)
Sparks (2015-2018)
Aliança para a Investigação do Atlântico – CSA (2015-2020)
Space Awareness (2015-2018)
Synenergene (2013-2017)
Conhecer o Oceano
Water Research Tour (2015-2017)

INICIATIVAS
Ciência Viva no Verão
Ocupação Científica dos Jovens
Semana C&T
Café de Ciência
Escola Ciência Viva
Fórum Ciência Viva

MEDIDAS DE APOIO
Escolher Ciência
Pais com a Ciência
Ciência nos Média
Integra

SITES
Circuitos Ciência Viva
Imprensa Regional
Videos Ciência Viva
Darwin

SOBRE
Agência Ciência Viva
Missão
Valores
Visão
Associados
Equipa
Logotipo - Download
Parceiros Internacionais
Imprensa
Regulamento - Rede de Centros Ciência Viva

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Pavilhão do Conhecimento - Centro Ciência Viva

NEWSLETTER
Nome
Email
Inscrever-se

SIGA-NOS

conhecer oceano

ABOUT ▾ OCEAN PRINCIPLES ▾ OCEAN AND SCHOOL ▾ LINKS ▾

The Principles in the school curriculum

(ONLY IN PORTUGUESE)
Os Princípios Essenciais e Conceitos Fundamentais sobre o Oceano foram articulados com os diferentes níveis de escolaridade através de uma matriz.

Use o diagrama abaixo para um acesso rápido à zona específica que pretende explorar da matriz (Princípio e nível de escolaridade).

BLUE PLANET Oceans and Society a GEO Initiative
Copernicus Marine Service
SATELLITE EVENT TOULOUSE EUROPEAN CITY OF SCIENCE ESOF 2018

ESCOLA AZUL

Develops projects about the Ocean
Commits students and teachers
Engages students of different grades
Explores in different school subjects
Promotes its actions
Involves the Sea Sector
Engages the local community
Inspires students to take action
ESCOLA AZUL

4 GOALS

ESCOLA AZUL

- Promote ocean literacy in Portugal.
- Frame ocean literacy within the educational agenda.
- Reduce the barriers to ocean teaching in Portugal.
- Make schools more responsible for addressing oceans topics in a structured, interdisciplinary and vertical way.
- Encourage schools to actively involve the students in the search for solutions to problems related to the ocean.
- Create ties between schools and local communities.
- Activate synergies between the educational community and the sea stakeholders (economy, tourism, sports, science, technology, etc.).
- Foster the interaction between institutions with an active role in marine education, in order to create harmonised educational strategies.
- Emphasise the importance of emerging professions linked to the sea (science, engineering, law, economy, communication, etc.).
- Include ocean literacy in the agenda of Portuguese political decision-makers.

Galway Statement Implementation Committee

"What"

- Atlantic Seabed Mapping and Characterization
- Aquaculture
- **Ocean Literacy, including Information Management and Dissemination**
- Ocean Health and Stressors
- Ocean Observation and Prediction

"How"

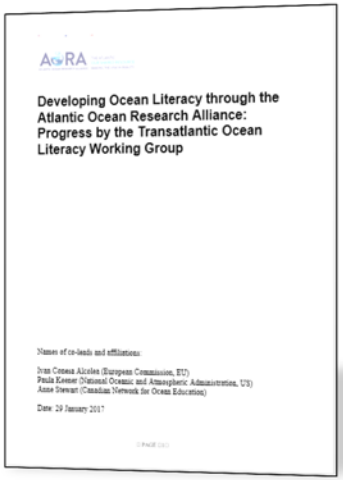
- Organizing, aligning, leveraging research activities
- Better coordination of data sharing
- Promoting researcher mobility
- Coordinating planning and programming

“Golden Papers” - Transatlantic Ocean Literacy

Achievements, Challenges, Recommendations, Forward-looking Opportunities

8 Milestones, 13 Operational Objectives, 16 Achievements, 29 Deliverables

- **Foundational Milestone 1**: First Wave of Stakeholder Meetings, 2012-2013
- **Foundational Milestone 2**: Agreement on the Ocean Literacy Essential Principles for the Transatlantic Cooperation and Development of a Vision Statement, September, 2013
- **Foundational Milestone 3**: The Transatlantic Ocean Literacy Implementation Strategy (TIS), September 2014
- **Foundational Milestone 4**: EU funded projects BG13 Sea Change & ResponSEAble (starting in May 2015) and Installation of the International Advisory Group

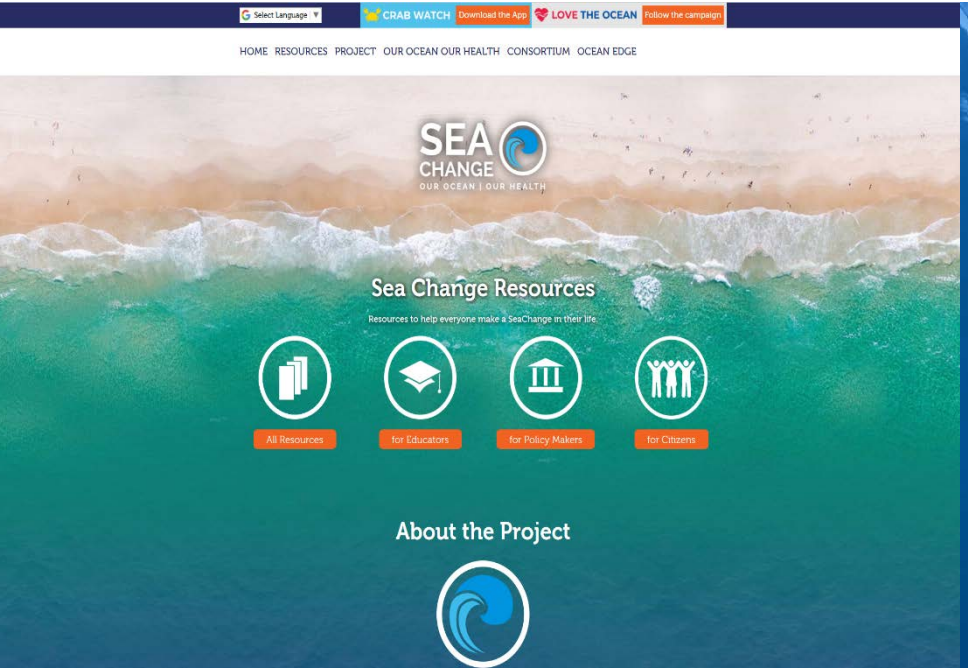

AORA

Developing Ocean Literacy through the Atlantic Ocean Research Alliance: Progress by the Transatlantic Ocean Literacy Working Group

Names of co-leads and affiliations:

Date: 29 January 2017

EU H2020 Blue Growth
Sea Change and ResponSEAble Projects



SEA CHANGE PROJECT

Based on the concept of Ocean Literacy, the project aims to change the way Europeans view their relationship with the ocean: **"empower citizens to take direct and sustainable action towards a healthy ocean, healthy communities and ultimately a healthy planet".**

Funded by the EU H2020 Programme; Involved 17 partner institutions from 9 countries and 6 Third Parties.

VISION

A society in which citizens are ocean literate and adapt their everyday behaviour to make informed and responsible decisions that promote ocean stewardship in a co-creation approach.

MISSION

Bring about a fundamental Sea Change in the way citizens view their relationship with the sea and empower them as "ocean literate" citizens.

VALUES

Respect for stakeholders values | Collaboration | Inclusiveness | Tolerance | Creativity | Passion |Reliability | Safety

LONG TERM GOALS

Ocean Literate
SCHOOLS

Ocean Literate
CITIZENS

Ocean Literate
DECISION MAKERS &ENTREPRENEURS

Ocean Literate SCHOOLS

MOOCs

Blue Schools Project

On-line Seminars

EMSEA

Project resources:
Infographics
Videos
Brochures
Factsheets
Leaflets
E-book: Harmful Algal Blooms
Ocean EDGE Directory
Blue Schools teaching-modules

Ocean Literacy forAll

Ocean Literate CITIZENS

Coastal Safety Platform

Crab Watch

ECSITE

Magellan Circumnavigation Project

World Ocean Day

Ocean Literacy forAll

Ocean Champions

Ocean Literate DECISION MAKERS & ENTREPRENEURS

Transatlantic cooperation

European Maritime Day

National & European networks

Ocean Literacy forAll

OPERATIONAL OBJECTIVES

1 LONG TERM GOAL

MOOCs *(UNESCO)*

- Define an organizing committee (2018)
- Define hosting platform (2018)
- Define periodicity (2018)
- Define topics (2018)
- Define program and target groups (2018)
- Run the MOOCs (2019-2023)

BLUE SCHOOLS PROJECT

- Identify potential regions/countries (2018)
- Design a project based on the Sea Change Blue School Concept (2018-2019)
- EU funding or regional/ national funding (2019-2023)
- Implement the project (2020-2023)

ON-LINE SEMINARS *(CO-EXPLORATION)*

- Define an organizing committee (2018)
- Define periodicity (2018)
- Define topics (2018)
- Define program and target groups (2018)
- Run the Seminars (2019-2023)

Developing the Mediterranean Sea Literacy principles

Aim of this initiative: to provide a tool for educators, scientists, NGOs, and blue economy actors to develop a better understanding of what makes the Mare Nostrum so special.

Methodology: The EMSEA-Med members, according to their expertise, decided to work in groups on specific concepts of each of the 7 essential principles of ocean literacy in an effort to adapt all of them to the Mediterranean Region.

Next steps:

1. Peer-review of the MSL principles.
2. Develop the concept for the Med Sea Literacy Principles campaign.

JOIN US IN THIS INITIATIVE
contact us at:
emsea-med@emseanet.eu

Or go to
www.emsea.eu

The Mediterranean Sea Literacy has been developed by the following people:

Melita Mokos – *University of Zadar, Croatia;*
Giulia Realdon – *University of Camerino, Italy;*
Monica Previati - *Underwater Bio-Cartography (U.BI.CA s.r.l.), Italy;*
Maria Cheimonopoulou - *Hydrobiological Station of Pella, Ministry of Rural Development and Food, Greece;*
Alessio Satta - *Mediterranean Sea and Coast Foundation, Italy;*
Francesca Santoro - *Intergovernmental Oceanographic Commission of UNESCO;*
Yolanda Koulouri, Christos Ioakeimidis & Martha Papathanassiou - *Hellenic Centre for Marine Research, Greece;*
Alba Tojeiro, Carla A. Chicote & ***Manel Gazo*** - *SUBMON - Marine Environmental Services, Barcelona, Catalonia - Spain;*
Thanos Mogias, Theodora Boubonari & Theodoros Kevrekidis- *Democritus University of Thrace, Greece.*

Photographs courtesy of Manel Gazo, Yiannis Issaris & Alain Deidun.

Mediterranean Sea Literacy

AN INNOVATIVE AND COLLABORATIVE EFFORT

EMSEA
EUROPEAN MARINE SCIENCE EDUCATORS ASSOCIATION

A non-profit International Organisation that aims to support marine educators in the task of making European citizens Ocean Literate.

EMSEA - MED

In 2015 a number of participants from the Mediterranean region (Fig. 1) gathered at the 3rd European Marine Science Educators Association (EMSEA) conference in Crete to form the first EMSEA Regional Seas Group.

EMSEA - MED aims to raise Mediterranean citizens' awareness of the specific features of this basin which is an essential precondition for delivering the wider objective of sustainable development consistent with the EU BLUEMED initiative for Blue Growth and jobs in the Mediterranean.

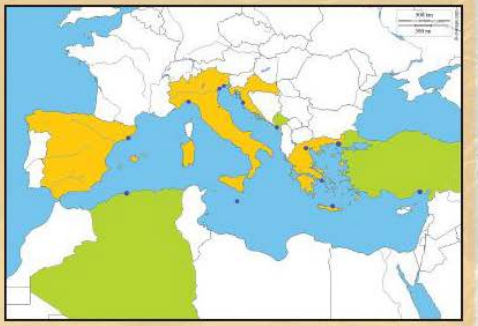


Figure 1. Countries currently involved in the MSL initiative (black dots: Headquarters of institutions; yellow: currently active countries; green: supportive countries).

Ocean Literacy - An understanding of the ocean's influence on you - and your influence on the ocean.

A framework made up of 7 essential principles, developed in the United States and now adapted for the Mediterranean Sea.

Ocean Literacy (OL) Principles

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

The Mediterranean Sea Literacy (MSL) Principles

- **MSL 1** The Mediterranean Sea, almost enclosed by land of three continents (Europe, Africa and Asia) with many unique features, is connected to the one big ocean of the Earth.
- **MSL 2** The Mediterranean Sea and its living organisms shape the features of the Mediterranean basin and its adjacent land masses.
- **MSL 3** The Mediterranean Sea has a major influence on climate and weather of the Mediterranean region.
- **MSL 4** The Mediterranean Sea made the Mediterranean region habitable through its richness of life and its influence on the mainland which then became a cradle of world civilization.
- **MSL 5** The Mediterranean Sea is a marine biodiversity hot spot, with a high level of endemism.
- **MSL 6** Culture, history, economy, lifestyle, and well-being of its inhabitants are inextricably connected to the Mediterranean Sea.
- **MSL 7** A considerable part of the Mediterranean Sea is yet to be investigated.

EU H2020 ResponSEAble Ocean Literacy Webinars September 2018 – February 2019

RESPONSEABLE

ABOUT KEY STORIES NEWS & EVE

News ▸ The webinars : registrations are open

The webinars : registrations are open

How can we encourage Europeans to **take a closer interest in their seas** and to treat them with greater respect?

What knowledge do they need?
Who needs to know what ?
How we should communicate it?
Which conditions for translating "better knowledge" into acts?

By generating greater public debate and knowledge, ResponSEAble project, intends to support all sectors of European society to develop a more informed and responsible attitude and help secure healthier and more sustainable seas.We are inviting you to our *series of interactive webinars* to discuss how to collectively build effective ocean literacy in Europe!

Why you should attend?

The webinars aimed at sharing **views , challenges and best practices** on ocean literacy in all its dimensions, **widening the European community of ocean literacy practitioners**.

If you are

- Involved in developing communication tools about the marine environment or the sustainable development of maritime sectors;
- Developing strategies for raising awareness for specific target groups on the human-sea interactions;
- Scientist involved in education initiatives on the sea with educators and civil society organisations, children and youths;
- Manager, planner, economic actor or concerned citizen interested in "making things better"

Recent news

- ResponSEAble films at PELICAM film festival
- The webinars : registrations are open
- Two days in the European Maritime Day 2018 in Burgas
- Throwback to World Oceans Day 2018 in Paris
- ResponSEAble Seminar: Eutrophication beyond 2020

RESPONSEABLE

ABOU

WEBINAR 2 — September 13, 2018
Children and the oceans: opportunities and challenges for ocean education
Information and registration

WEBINAR 3 — October 11, 2018
Linking the oceans to our consumption habits: opportunities and challenges of consumers literacy
Information and registration

WEBINAR 4 — November 8, 2018
Connecting business to our oceans: opportunities and challenges of ocean literacy for economic actors
Information and registration

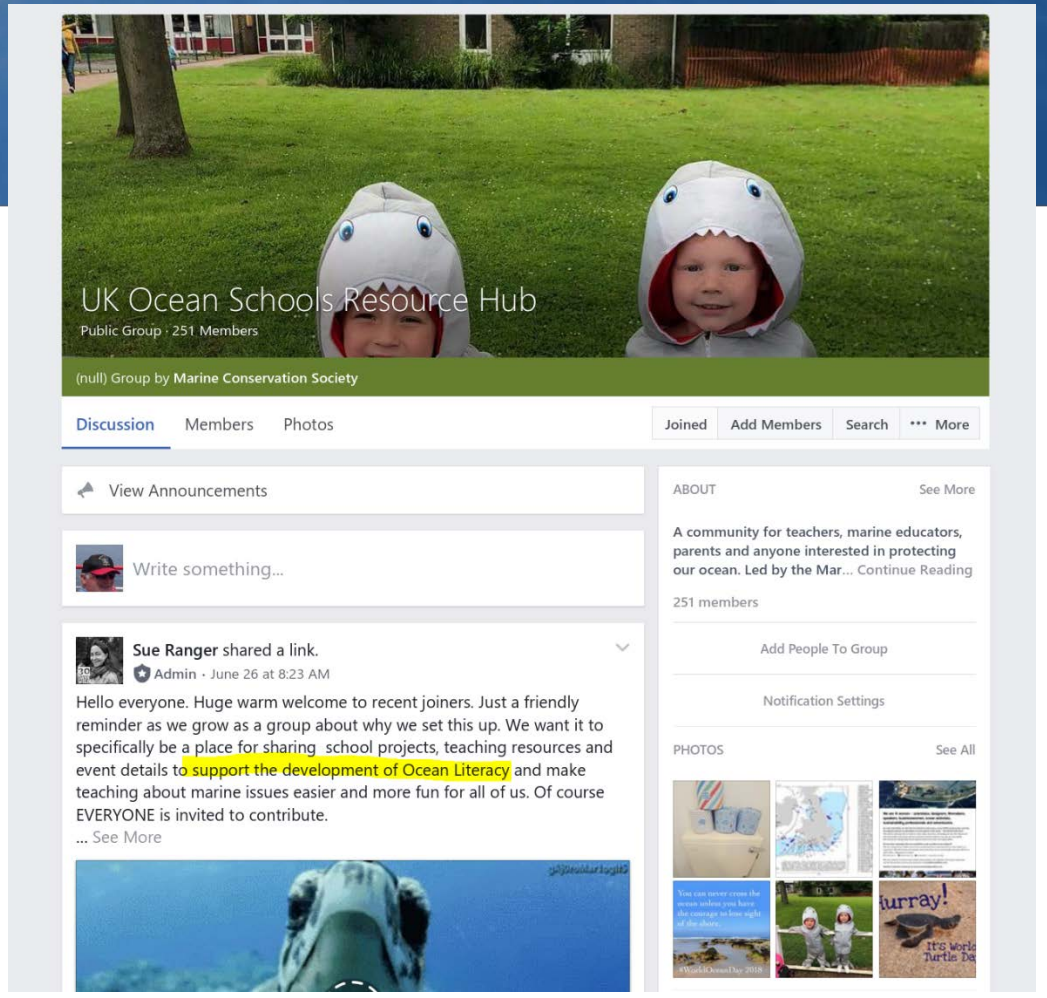
WEBINAR 5 — December 6, 2018
Ensuring sustainable Blue Growth: opportunities and challenges of ocean literacy for policy makers
Information and registration

WEBINAR 6 — January 17, 2019
Think, Hope, Change: assessing effectiveness of ocean literacy tools
Information and registration

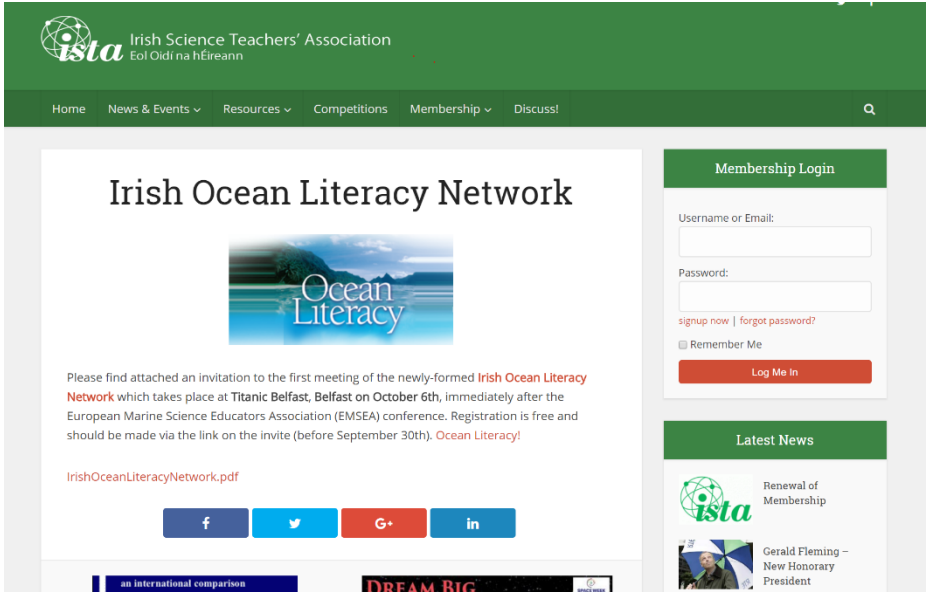
WEBINAR 7 — February, 2019
Supporting the strengthening of a wider European Ocean Literacy initiative
Information and registration

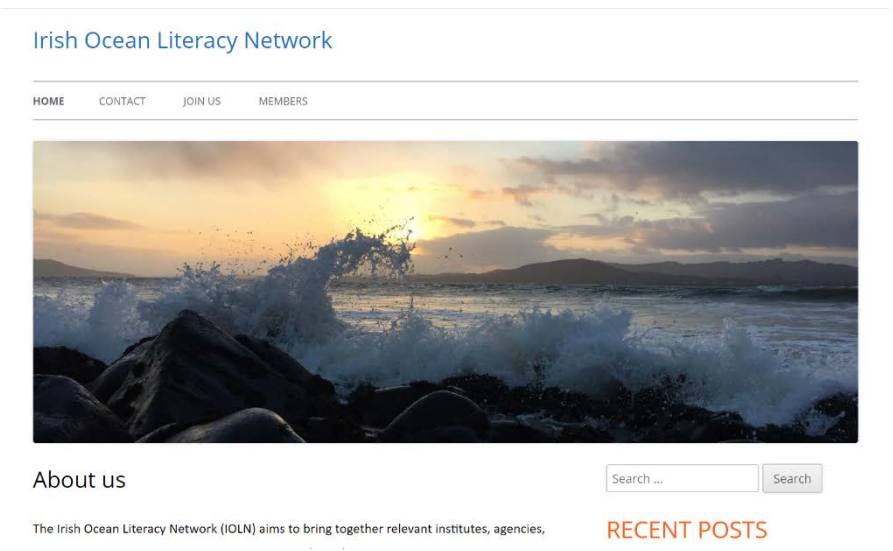
BLUE PLANET Oceans and Society a GEO Initiative
Copernicus Marine Service
SATELLITE EVENT TOULOUSE EUROPEAN CITY OF SCIENCE ESOF 2018

UK Schools Resource hub

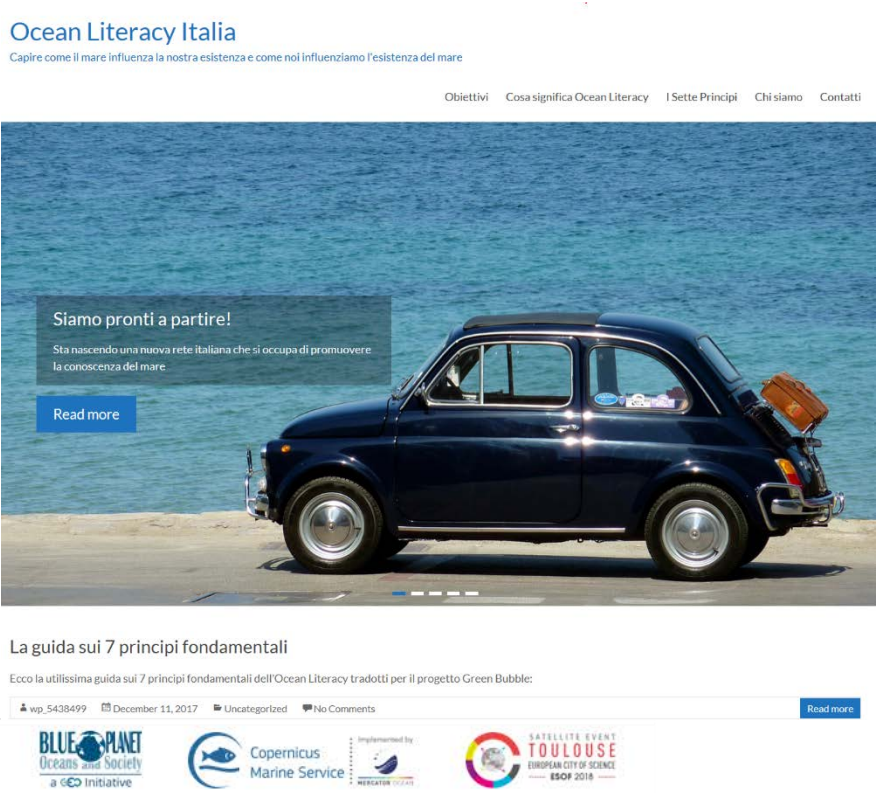


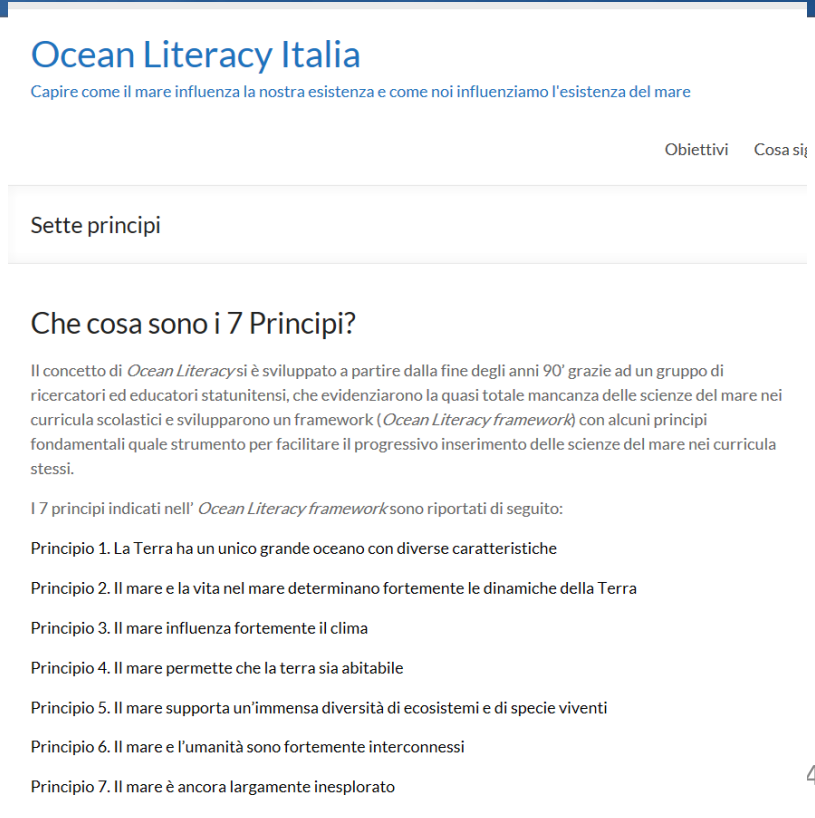
Irish Ocean Literacy





Ocean Literacy Italia

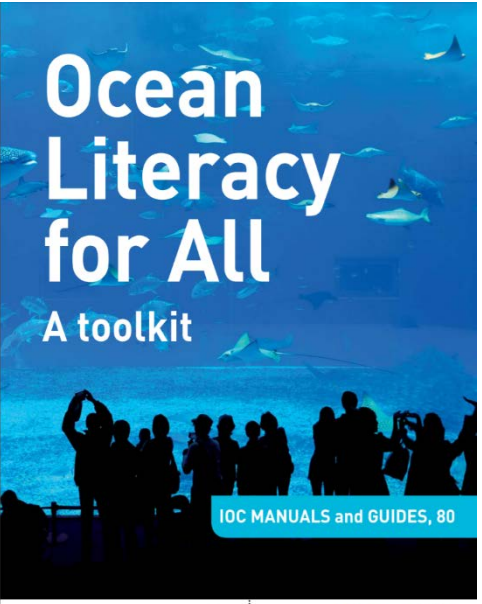




UN Conference on the Ocean June 2017 Side Event
COSEE, College of Exploration, UNESCO

http://www.coexploration.org/gose

UNESCO Ocean Literacy for All 2017



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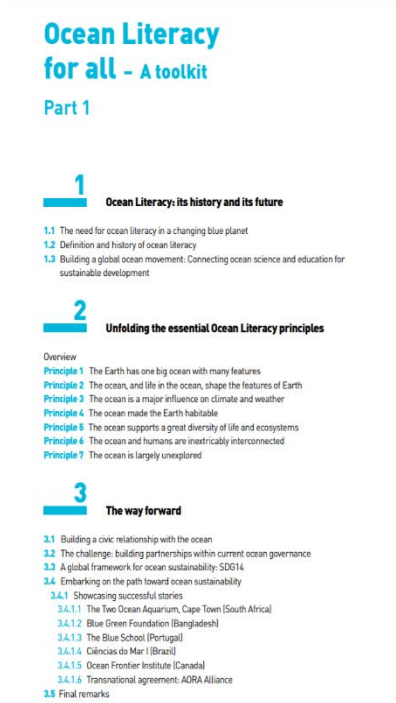


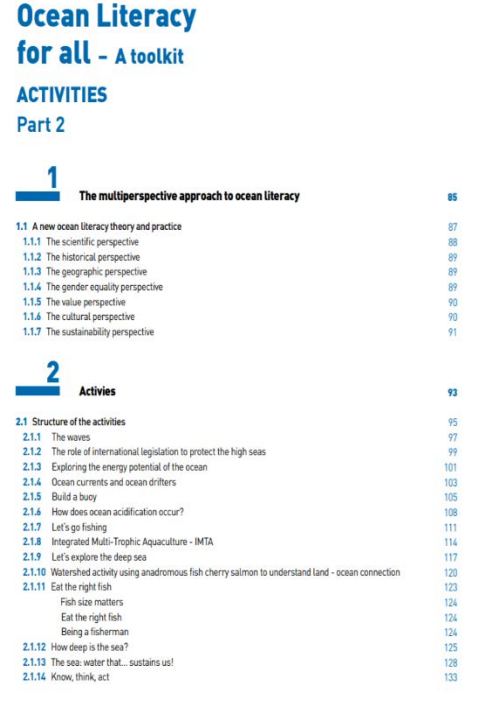
Ocean Literacy for all – A toolkit

Part 1

1 Ocean Literacy: its history and its future
1.1 The need for ocean literacy in a changing blue planet
1.2 Definition and history of ocean literacy
1.3 Building a global ocean movement: Connecting ocean science and education for sustainable development

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

3 The way forward
3.1 Building a civic relationship with the ocean
3.2 The challenge: building partnerships within current ocean governance
3.3 A global framework for ocean sustainability: SDG14
3.4 Embarking on the path toward ocean sustainability
3.4.1 Showcasing successful stories
3.4.1.1 The Two Ocean Aquarium, Cape Town (South Africa)
3.4.1.2 Blue Green Foundation (Bangladesh)
3.4.1.3 The Blue School (Portugal)
3.4.1.4 Ciências do Mar I (Brazil)
3.4.1.5 Ocean Frontier Institute (Canada)
3.4.1.6 Transnational agreement: AORA Alliance
3.5 Final remarks



Ocean Literacy for all – A toolkit

ACTIVITIES

Part 2

1 The multiperspective approach to ocean literacy 85

1.1 A new ocean literacy theory and practice 87
1.1.1 The scientific perspective 88
1.1.2 The historical perspective 89
1.1.3 The geographic perspective 89
1.1.4 The gender equality perspective 89
1.1.5 The value perspective 90
1.1.6 The cultural perspective 90
1.1.7 The sustainability perspective 91

2 Activies 93

2.1 Structure of the activities 95
2.1.1 The waves 97
2.1.2 The role of international legislation to protect the high seas 99
2.1.3 Exploring the energy potential of the ocean 101
2.1.4 Ocean currents and ocean drifters 103
2.1.5 Build a buoy 105
2.1.6 How does ocean acidification occur? 108
2.1.7 Let's go fishing 111
2.1.8 Integrated Multi-Trophic Aquaculture - IMTA 114
2.1.9 Let's explore the deep sea 117
2.1.10 Watershed activity using anadromous fish cherry salmon to understand land - ocean connection 120
2.1.11 Eat the right fish 123
Fish size matters 124
Eat the right fish 124
Being a fisherman 124
2.1.12 How deep is the sea? 125
2.1.13 The sea: water that... sustains us! 128
2.1.14 Know, think, act 133

Bangladesh – Ocean Literacy

Japan Ocean Literacy

The Fundamentals of Aquatic, Marince Environmental Literacy

#1 What is literacy?
1 Aquatic Marine Environmental literacy an understanding of the ocean's influence on you-and your influence on the ocean.
An A.M.E literate person can observe imminent aquatic marine environments scientifically, consider various problems related to aquatic marine environments together with people, understand aquatic marine environmental literacy that is comprehensive knowledge, make responsible decisions and take responsible actions based on wider perspectives, and convey them to as many people as possible in an easy-to-understand fashion.
#2 Environment and Society
1 It is important to make a hypothesis and collect and analyze data, and recognize things scientifically.Furthermore, science (technology) shows big ability when aquatic and marine environment is investigated and analyzed.
2 "The problem" of the environmental problem hasn't defined any longer, and it isn't taught and given by someone "It is a problem." A matter of a certain thing and matter is discovered, and recognized, and recognized socially, and it causes
3 In hydrosphere it is difficult to understand what is problem, but it is important to address as a topic and to recognize as a problem by using scientific experiment, investigation and analyzing(approach).
4 But, after industrial revolution, by the science and technology, nature environment have been broken. it is fact that scientific approach is not always
5 It is important not only scientific thinking about environment but also social and historical view when you investigate environment.
[2年環境] 海洋環境経済論
[3年環境] 環境汚染防止論
[3年政策] 生命論, 科学技術論, 科学哲学, 生命論の諸問題, 科学技術論の諸問題, 科学哲学の諸問題, 国際文化思想論, 海洋文学, 環境思想
#3 Ocean as Environment
1 地球表面のほぼ70%を占める海には他の惑星にはない大きな特徴がある。太平洋, 大西洋, インド洋, 北極海, 南大洋と広大な面積を有する５大洋は, ひとつの繋がった海なのである。
2 大洋の大きさ, 形, 海底地形の特徴（島, 海淵, 海嶺, 海谷など）は地球内部の運動によって引き起こされた大陸移動とともに形成されている。地球上の最も高い山, 最も深い谷, 最大の広野など, 全ては海洋の内部にある。(1.b)
3 海洋には海洋大循環と呼ばれる大規模な海流がある。海面を通して加えられる熱エネルギーや海面風などが関与して海流は起こり, 地球自転の影響（コリオリの力）や摩擦力を受けながら海洋大循環は維持されている。海洋の形状や陸上の地形が海洋大循環の道すじ（ルート）に大きな影響を与えている。(1.c)
4 海水の基準面（あるいは単純に海水面）とは, 潮汐による干満や波の影響を除いた陸地に相対的な高さをいう。プレートの移動は大洋の大きさを変え, 陸地の高さを変えることから, 当然のこととして海水面も変化させる。陸上にある雪や氷が解けたり, 成長したりすると海水面も変化する。海水が温められたり, 冷やされたりすると, 膨張したり, 収縮する事から,
5 地球上に存在する水の約97%は海水である。海水は塩を含むので以下のような特有の性質を持っている。氷点は真水より1.8℃ほど低い, 密度(比重)は真水よりわずかに大きい, 電気伝導度は高いので海水は電気を通す, 弱いアルカリ性を示す, などである。海水中の塩の起源は陸上の岩石に含まれた塩が浸食され流入したもの, 火山の爆発によるもの, 海底からの溶出したもの, 大気から降下したもの等である。(1.e)

Ocean Literacy Program

Ocean Literacy Program

This program aims to enrich marine education in elementary and middle schools in order to nurture a public with broad and abundant knowledge of the ocean. This program began in October 2010 with financial assistance from the Nippon Foundation.

The Research Center for Marine Education (RCME) serves as the center of activities and is the first such organization in Japan to research and practice the promotion of marine education by coordinating with hub universities (Yokohama National University, University of the Ryukyus and others) and practicing elementary, middle and high schools nationwide.

The Center's Marine Education Policy Studies Unit develops a marine curriculum for elementary and middle school education, and guides the instruction and training of educators who will take the lead in marine education. The main purpose of the Marine Human Resources Development Studies Unit is researching and developing teaching materials for use in marine education, and the development of human resources who will make use of these teaching materials.

The main characteristics of this program are its ability to conduct research on promoting marine education from the perspective of higher and social education, and its coordination with other programs towards the objective of solving social issues and educating at the university level.

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Contents

Main Activities

- Marine Affairs Basic Program
- Interdisciplinary EducationProgram on Ocean Science and Policy
- Ocean Literacy Program
- Hiratsuka Offshore ExperimentTower Program

page top

Taiwan Marine Education

- Marine Education integrated into the curriculum
- Marine Leisure
- Marine Culture
- Marine society
- Marine Science
- Marine Resources

Development of Marine Education in Taiwan

- **(UNESCO, 1988) United Nations Educational, Scientific and Cultural Organization**

⇩

The general marine science education focuses on improving global citizens' knowledge of marine science.

- **The *White Paper on the Marine Education Policy* (Ministry of Education, 2007)**

⇩

To improve the competitiveness of the national marine industry and motivating people to understand, love, utilize, and protect the ocean.

Love the ocean.

White Paper on the Marine Education Policy

Understand the ocean

Protect the ocean

before

Marine education primarily emphasized specialized maritime education.

the *White Paper on the Marine Education Policy(2007)*

after

General marine education has received attention and been progressively implemented in the national compulsory education program.

※Educated citizens in Taiwan still lack the marine science literacy.

Approaches for Implementing Marine Education in Taiwan

(2007) **The *White Paper on the Marine Education Policy***

⇩

Seven learning fields of the Grade 1–9 Curriculum Guidelines

(2008) **Marine education was incorporated into the Grade 1–9 Curriculum Guidelines.**

⇩

Five topics: Marine leisure , marine culture, marine society, marine science, and marine resources.

Center for Ocean Sciences Education Excellence
中国海洋科学卓越教育伙伴计划

- Improve ocean literacy and awareness at the K-12, public, and university levels
- Foster relationships between ocean scientists and educators, both internationally and domestically
- Bring marine sciences to the forefront of national development strategies and promote its protection

- Themed weekend “camps”
- Public lectures/School visits
- Special Events

Aquatic Sciences Eco-Learning Programme

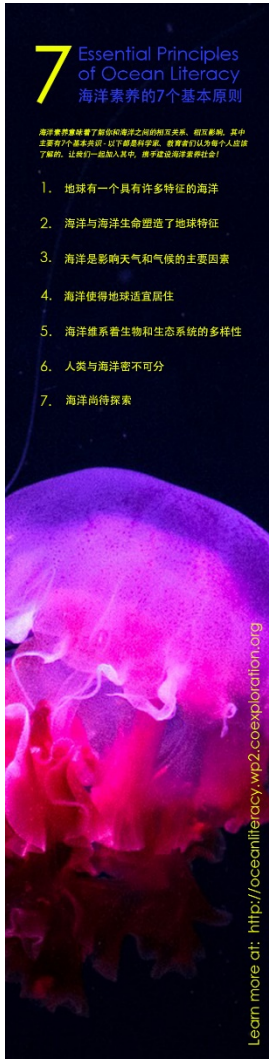
- Since 2012*
- 5 days
- 30-40 middle school students
- 2:5 counselor to camper ratio

*Skipped in 2013

Ocean Sciences Day

- Since 2012
- 6000-7000 visitors
- 1st or 2nd Sunday in Nov.
- Interactive displays

OCEAN 7
海洋文化基本理论
1 地球有一个巨大的海洋.
© Nasa Stocks, NASA Goddard Space Flight Center
2 海洋使地球成形.
3 海洋影响地球的气候.
© Jacques Descloitres, MODIS Rapid Response Team, NASA/GSFC
4 海洋使得地球成为适合居住的星球.
5 海洋支持着生命和生态系统多样性.
6 海洋与我们相连，我们与海洋同在.
7 海洋的绝大部分还未被勘察.
更多详情请登录
Ocean7.org


7 Essential Principles of Ocean Literacy
海洋素养的7个基本原则
海洋素养意味着了解你和海洋之间的相互关系、相互影响，其中主要有7个基本共识 - 以下都是科学家、教育者们认为每个人应该了解的，让我们一起加入其中，携手建设海洋素养社会！
1. 地球有一个具有许多特征的海洋
2. 海洋与海洋生命塑造了地球特征
3. 海洋是影响天气和气候的主要因素
4. 海洋使得地球适宜居住
5. 海洋维系着生物和生态系统的多样性
6. 人类与海洋密不可分
7. 海洋尚待探索
Learn more at: http://oceanliteracy.wp2.coexploration.org

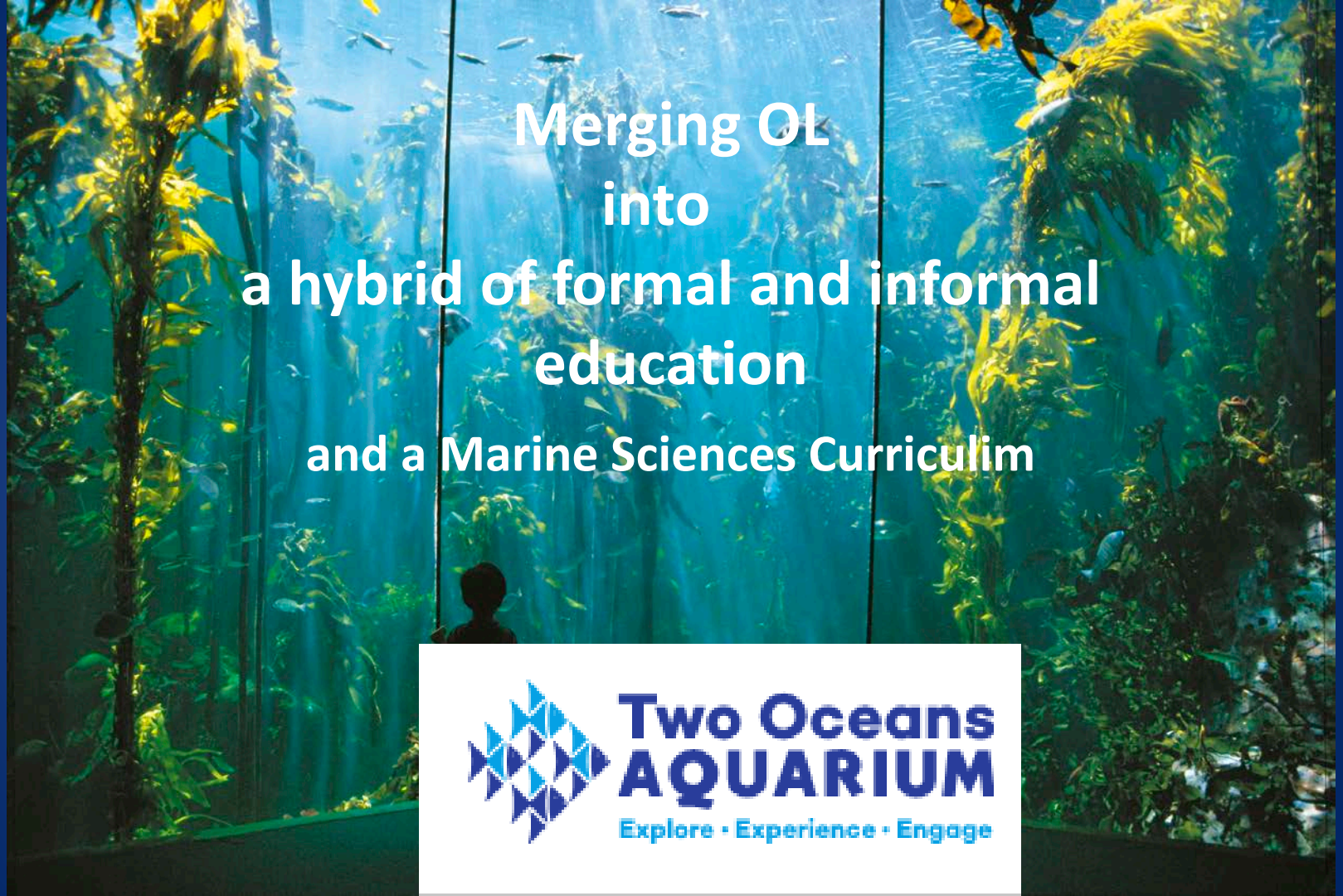
Introducing the *S V Pelican 1*

Two Bays, *Pelican 1* and Sea Country

- The *S V Pelican 1* was built by and is run by a not-for-profit group in Australia.
- For the past 13 Australian summers this group has presented a marine education program in the two large bays close to the city of Melbourne (Port Phillip and Western Port).
- See **Two Bays** at https://pelican-expeditions.squarespace.com
- Marine science, ocean literacy and traditional knowledge are key components of all Two Bays programs.
- Local First Nation (Aboriginal) Arweets (elders) are major contributors of Two Bays programs. One part of the 'ocean dialogs' that have evolved aboard the *Pelican 1* relates to the way in which oral tradition and marine science come together.
- Video https://pelican-expeditions.squarespace.com/two-bays-2014

An Arweet and a scientist / educator

Are you ocean literate?



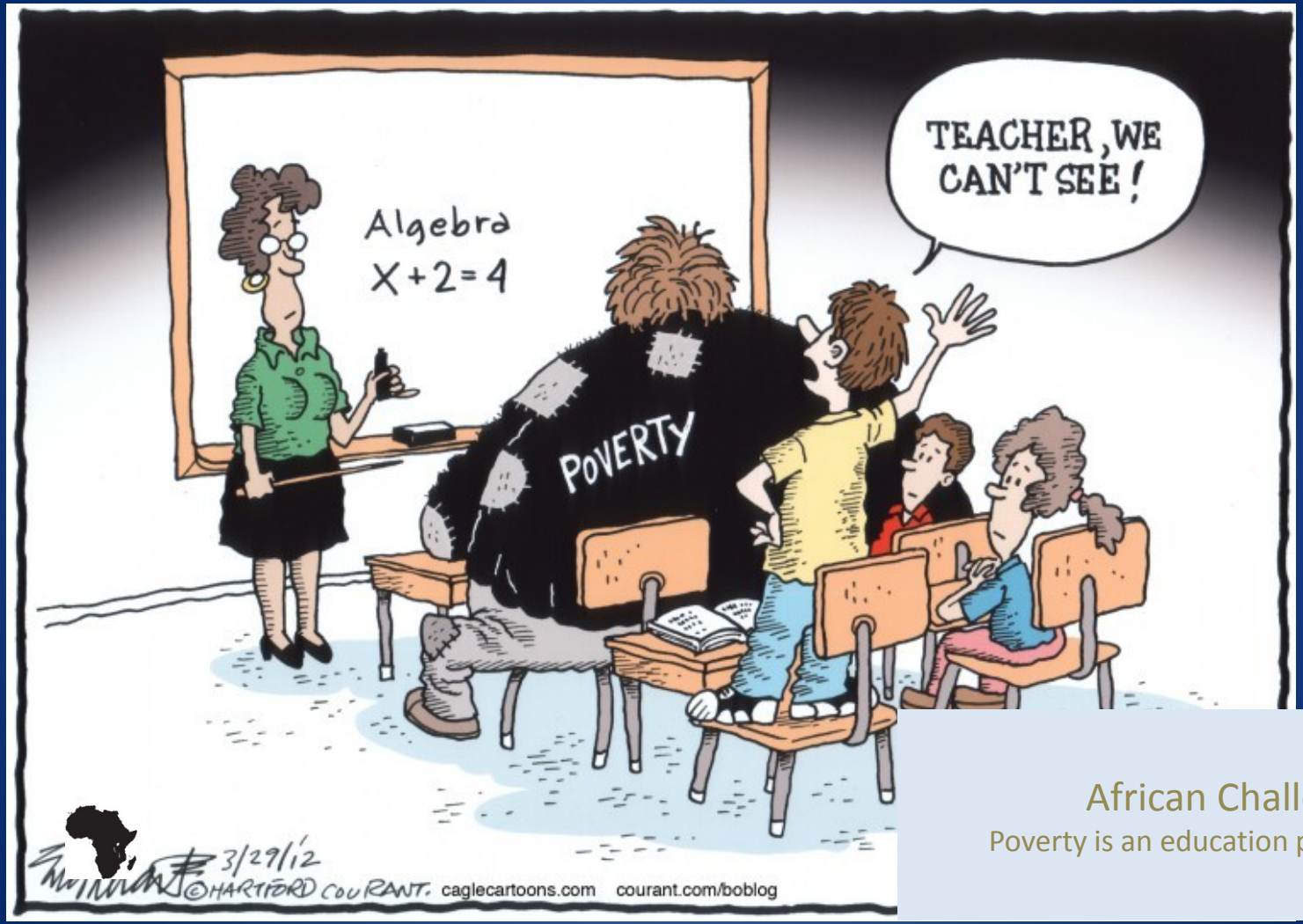
Merging OL into a hybrid of formal and informal education

and a Marine Sciences Curriculim

Two Oceans AQUARIUM

Explore · Experience · Engage

- 30.37 mil km^2
- 1500 -2 000 languages spoken
- South Africa has 11 official languages
- 1.216 billion people
- 52 countries
- Sub Saharan Africa lowest level of literacy 70%.
- Sub Saharan Africa 25% children < 5 yrs malnourished.



African Challenge

Poverty is an education problem

Marine Sciences Academy's Courses

Course	Grade	Content supplementing CAPS and much more
Junior Biologist	6	**Fun intro to Marine Science**
Smart Living	7	**Environmentally-sensitive living**
Marine Sciences	8 & 9	
Young Biologist	10	**Marine Biological content**
Ocean Science	11	**Link to basic Oceanography at University**
Marine Biology	11	**Shape and form of life, linked to University Zoology**

Ocean Literacy 2018-2038
Some thoughts on Design Principles

- Local relevancy – sense of place – (eg Toulouse – GeoTraces.org)
- Geography and Science and Policy and Economics and and – holistic integration and transdisciplinary and systems approaches
- Water - River to Sea to Ocean
- Words matter
- Participative and collaborative
- Coordinated and consistent for clarity
- Independent or autonomous

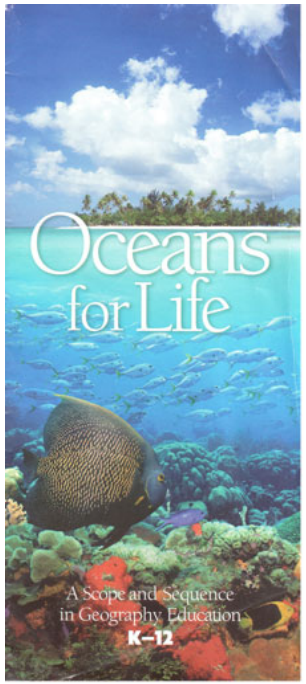
Ocean Literacy

- Two English words: Global & International Social, Political Value
- Originated in the USA around 2000 – for use in the USA to identify ocean science content to teach K-12 science, however..
- The idea, the term has developed international attention
- Now used around the world – latest is UNESCO “Ocean Literacy for All” project launched at UN Conference on the Ocean June 2017
- Two English words not easily translated into other languages
- Sparks conversations about what does it mean to you, to me, to us

Ocean Literacy – two words as symbol

- a process of understanding our reciprocal relation to/with the ocean
- a process of creating local descriptions of the relation consistent with global process
- developing educational programs for schools and general public
- creative translation and application to local realities
- a process of engagement and dialogue about what is important for every person on the planet to know and understand about the ocean
- One clear voice in cluttered communication space globally

Ocean Literay Online Conference
Oceans For Life 2002
Vital importance of PLACE BASED RELEVANCY



NATIONAL GEOGRAPHIC
Education Foundation

COLLEGE OF EXPLORATION

Identifying Ocean Content to Teach Geography

- Based on National Geographic Geography Scope and Sequence for K-12 Education
- http://oceanliteracy.wp2.coexploration.org/oceans-for-life/

Water in Toulouse – making connections to sea & ocean

Water from

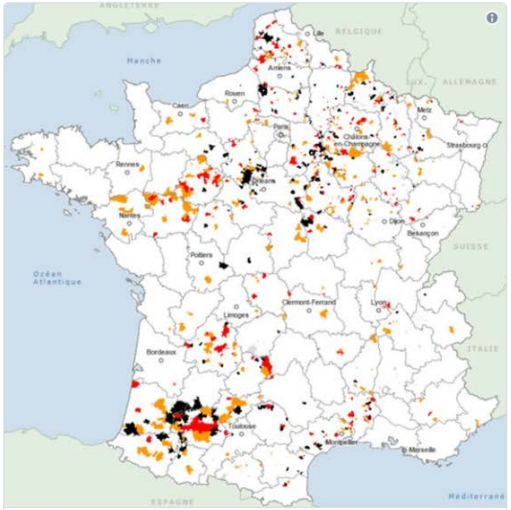
River La Garonne from Pyrenees in Spain

Exit to sea at Bordeaux

Regions of France named after rivers

In USA Colorado, Mississippi
In UK Avon,

//www.thelocal.fr/20170127/millions-in-rural-france-drink-polluted-tap-water



UFC-Que Choisir
@UFCquechoisir

#eaupotable #Pollutions #agricoles : les #pesticides 1ères causes de non conformités

5:37 AM - Jan 26, 2017

11 27 people are talking about this

Around three percent of households have polluted tap water due to the presence of lead, copper, or nickel from corroded pipes, the report found.

UFC Que Choisir pointed out that drinking tap water was 65 times cheaper than buying bottled water in France, and urged the government to consider "a fundamental reform of the agricultural water policy".

It also urged the government to launch an investigation into the nation's water lines, and to help anyone that might be affected by aged and corroded pipes.

The group's president Alain Bazot said that one in five people in France don't trust their tap water, and one in two prefers bottled water.

Topics to consider for ocean literacy in the next 20 years

- Partnerships
- Participation – engagement at all levels – role of social media – new governance
- Process – systems approaches
- Policy and politics and economics in global and rapid changing environment
- Priority issues – Plastics, Power, Planning,
- Population – considering growth - whole country, region, state, county, town
- Pedagogy – balance of constructivist and structured/prescriptive
- Principles – ocean, earth, climate
- Personally, culturally and linguistically relevant
- Proactive

Geo Blue Planet Outreach

https://geoblueplanet.org/who-we-are/working-groups/wg4/

- Support GEO Blue Planet projects

Preliminary tasks for 2017-18

1. Developing best practices in capacity building for ocean observations and services [underway] +
2. Producing a guide and template for communication strategies [completed] +
3. Mapping the ocean observation and services "seascape" [outstanding] +
4. Developing a brochure on the products of ocean observations [completed] +

Operational Modality and Participants

The priorities and activities of the WG on Developing Capacity and Societal Awareness will be developed and guided by a small, strategic team comprising of some members of the Blue Planet Steering Committee, complemented by a few additional members selected from the community based on the required expertise. It is anticipated that the group will consist of no more than 10 members, including two co-leads.

The Working Group will develop strategic priorities and short-term priority activities (see above for 2017-18 activities), and assemble Task Teams to work on these. It is anticipated that these Task Teams will be short-lived, working on tasks for periods of 6-18 months and disbanding once the deliverables have been produced.

Working Group members: +

Task Team on Best Practices in Capacity Building +

Task Team on mapping the ocean observing "seascape" +

Task Team to develop a brochure on the products of ocean observations +

What PROCESS to capture PASSION in the next 20 years? 2018-2038

- Not when I'm 64 as I am this year, but when I get older, when I'm 84!
- Priority Area 7 :Decade of Ocean Science 2021-2030
- UNESCO Ocean Literacy for All
- Local adaption like the Mediterranean Sea Literacy
- Water-river-sea-ocean
- Systems level management
- Systemic re-creation and reform of processes
- Engage the GEO BLUE PLANET community

Add Missing Voices

- Who is not here?
- Indigenous peoples and perspectives
- Traditional Knowledge
- Small Island Developing States
- Business

European Marine Science Educators Association Conference – October 2-5 2018

Continue the conversation

Emsea.eu

Newcastle, England

Ocean Literacy Conclusion

- Participation-Process-Passion-Purpose-Public-Place-Perspectives.
- Create and understand meaningful relation with and to the ocean.
- Enlarge the conversation, engage with those missing so far.
- Use words and symbols that are relevant and appropriate.
- Know where your water comes from.
- New technologies to connect and provide perspectives
- Join the global network at http://www.oceanliteracy.net