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The Blue Survey: Validation of an instrument to measure ocean literacy among adults

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Contribution to the Special Issue: "Ocean Literacy across the Mediterranean Sea region"

The Blue Survey: Validation of an instrument to measure ocean literacy among adults**Evelyn PAREDES-CORAL, Tim DEPREZ, Melita MOKOS, Ann VANREUSEL and Henk ROOSE***Mediterranean Marine Science, Special Issue, 23 (2), 2022***Table S1.** Items from Section I and the specific essential principle that is addressed by each item. The letters next to the essential principles represent the specific fundamental concepts of Ocean Literacy.

Items	Essential Principles & Fundamental Concepts	
The ocean affects your life because it	6 a	*
Approximately how much of the earth is covered by ocean?	1 a	
The ocean dynamics (the motion of water within the ocean) is powered by	1 c	*
The ocean is large and finite. Its resources are	1 h	
What is causing sea level rise?	1 d	*
The ocean helps to _____ global warming by absorbing human-produced CO ₂ from the atmosphere	2 d / 3 e,f	*
Which of the following are transported by rivers to the ocean?	1 g	*
Beaches and coastlines are particularly vulnerable to pollution caused by	6 d	
What produces most of the earth's oxygen?	4 a/3 e	*
There are several economic activities collectively taking place in the ocean (e.g., fisheries, shipping, offshore energy, etc). Effective management of the maritime space across borders and sectors should lead to	6 g	
Look at the image. If both cities are at the same elevation, it is likely that:	3 b	*
In the ocean, living spaces and habitats are found	5 e	*
Which of the following options provide habitat for one-third of all marine species?	5 e	
The ocean is the last and largest unexplored place on earth. How much of the ocean remains unexplored?	7 a	
How is the climate change impacting the Arctic?	6 e	*
Oil spills affect the marine environment by	6 d	
Most of the antifouling paints that are used to keep ship hulls and floating structures free of marine organisms are	6 d	*
Marine renewable energy industries (e.g., offshore wind, tidal and wave energy) may affect the ocean in a variety of ways, such as	6 d	*
What are the most frequent effects derived from the concentration of industrial activities near the seashore?	6 d	
Most of the marine invasive species are introduced and dispersed to new habitats by	6 d	

*Items retained after validation.

Table S2. List of validated questions from The Blue Survey. Items with (*) represent the correct answers.

Knowledge about ocean-related topics

The ocean affects your life because it

- ☐ provides food and medicine*
- ☐ provides mineral and energy resources*
- ☐ regulates the temperature*
- ☐ provides recreation and jobs*

The ocean dynamics (the motion of water within the ocean) is powered by

- ☐ tides*
- ☐ winds*
- ☐ earth's rotation*
- ☐ tsunamis

What is causing sea level rise?

- ☐ warming of the ocean*
- ☐ ocean acidification
- ☐ increasing melting of glaciers and ice sheets*
- ☐ heavy rainfall in the tropics

The ocean helps to _____ global warming by absorbing human-produced CO₂ from the atmosphere

- ☐ accelerate
- ☐ stop
- ☐ slow*
- ☐ none of these

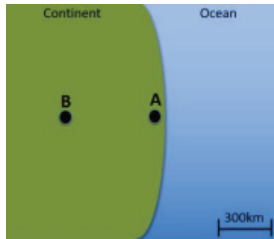
Which of the following are transported by rivers to the ocean?

- ☐ nutrients*
- ☐ (micro)plastics*
- ☐ sediments*
- ☐ pollutants*

What produces most of the earth's oxygen?

- ☐ forests
- ☐ algae in the ocean*
- ☐ both equally
- ☐ none of these

Look at the image. If both cities are at the same elevation, it is likely that:



- ☐ City A will have warmer summers and cooler winters than city B
- ☐ City A will have warmer summers and warmer winters than city B
- ☐ City A will have cooler summers and warmer winters than city B*
- ☐ City A will have similar temperatures as city B in each season
- ☐ none of these

In the ocean, living spaces and habitats are found

- ☐ at the surface*
- ☐ in the water column*
- ☐ on the seafloor*
- ☐ none of these

How is the climate change impacting the Arctic?

- ☐ The impact on the Arctic is the same as on the rest on the planet
- ☐ The Arctic is warming faster than the rest of the planet*
- ☐ Ice is melting in some parts of the Arctic and growing in other parts
- ☐ Tropical fish are migrating to the Arctic
- ☐ none of these

Most of the antifouling paints that are used to keep ship hulls and floating structures free of marine organisms are

- ☐ harmless
- ☐ persistent and accumulative in organisms*
- ☐ toxic*
- ☐ none of these

Marine renewable energy industries (e.g., offshore wind, tidal and wave energy) may affect the ocean in a variety of ways, such as

- ☐ visual pollution*
- ☐ collision with seabirds*
- ☐ underwater noise*
- ☐ harmful algal blooms

Personal interest in ocean-related aspects

<i>To what extent do the following aspects of the ocean interest you?</i>	not at all	a little bit	neutral	quite a bit	a lot
I am interested in marine energy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am interested in ocean science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am interested in maritime jobs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am interested in the recreational aspects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am interested in the aesthetic aspects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Ocean-friendly behaviour

Considering a period of one year prior to this survey. How often do you undertake the following actions in your day-to-day life?

	never	rarely	some-times	often	always
I avoid products with ingredients that are toxic for the marine environment or that are derived from endangered marine organisms	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I reduce my energy consumption at home	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I take short showers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I opt for plastic-free alternatives	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Ocean stewardship

*To what extent do you agree/disagree with the following statements regarding ocean sustainability? *Ocean sustainability focuses on managing our ocean and its services without compromising them for future generations*

	strongly disagree	disagree	neutral	agree	strongly agree
I understand the issues facing the global ocean	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My actions can have a significant effect on the health of oceans and coastal areas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have a personal responsibility to work for the health of oceans and coastal areas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The health of the ocean is important to human survival	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Business and industry should be responsible for ocean sustainability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Individual citizens should be responsible for ocean sustainability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ocean sustainability is more important than economic growth	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Ocean as economic resource

To what extent do you agree/disagree with the following statements regarding human utilization of the ocean?

	strongly disagree	disagree	neutral	agree	strongly agree
It is all right for humans to use the ocean as a resource for economic purposes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We should no longer use the ocean as a resource for economic purposes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Maritime economic activities are compatible with ocean sustainability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Willingness to act

How often would you be willing to undertake the following responsible actions towards the ocean in your day-to-day life?

	never	rarely	some-times	often	always
I would be willing to avoid products with ingredients that are toxic for the marine environment or that are derived from endangered marine organisms	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would be willing to reduce my energy consumption at home	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would be willing to take short showers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would be willing to opt for plastic-free alternatives	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The six sub-dimensions obtained by Exploratory Factor Analyses are in bold. Questions with checkboxes ☐ have more than one correct option, participants were asked to check all that applied. The Blue Survey re-used existing items from validated surveys (Cudaback, 2006; Greely, 2008; Chen *et al.*, 2020).