

## **A window to the sea: RAIA Observatory tool for assessing environmental risks in the NW Iberian coastal upwelling system.**

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**Abstract** – The international RAIA Observatory serves the main maritime activities of the NW Iberian coastal upwelling system. Over the last few years, the partners of the observatory have identified at least 12 key environmental risks that can potentially affect the ecosystem services of this coastal area. In order to evaluate these risks, different environmental indicators are used, which are developed and optimized according to the specifications provided by international environmental agencies. *A Window to the Sea* is the publicly-accessible web-service created to present and share the results from this evaluation. So far, current results have allowed to establish risk assessment protocols for the coastal region, and identify critical observational gaps. The web-is user-friendly with the intention to achieve as many end-users as possible, not only from academia, but also from other governmental institutions, fisheries, enterprises and the general public.

**Keywords** – Environmental Risk, Environmental Indicators, Global Change, Web-Service, RAIA Observatory, NW Iberian Peninsula.

### I. THE RAIA OBSERVATORY

The RAIA Observatory resulted from the effort of 12 research and academic institutions and public agencies (Spanish and Portuguese) developing meteorological and oceanographic studies along the shelf and coastal region of the NW Iberian upwelling system, and it is the first transnational observatory in Europe.

The observatory ([www.marnaraia.org](http://www.marnaraia.org)) is organized on the bases of an observational network, numerical models and services. The observational system includes data from a wide variety of instruments (buoys, tide gauges, meteorological stations, radars...) and from cruise repeats. The high-resolution regional models (meteorological and hydrodynamic) offer information on dynamics and biogeochemistry of the coastal region, including 72-hour predictions. Since the beginning, the RAIA Observatory provides data, information and services to the main maritime activities of the NW Iberian coastal area (fisheries, maritime transport, marine renewal energies...) and specific tools have also been developed for certain users (recreational divers, sea-shell gatherers).

### II. ENVIRONMENTAL RISKS AND INDICATORS

Coastal ecosystems and their services are the most at threat from the impacts of global change and the increasing of human population [1]. Considering this and that recent international efforts (i.e., the Sustainable Development Goals and the COP21 Paris agreement) are calling for progress towards a more resilient and sustainable future, the different partners of the RAIA Observatory have worked to identify potential environmental risks, and their correspondent environmental indicators, affecting the NW Iberian coastal upwelling system. An environmental indicator is a measure, generally quantitative, that illustrates and communicates complex environmental phenomena simply, providing insight into the state of the environment, and are fundamental tools for the evaluation and mitigation of environmental risks. [2]

In 2019, the partnership under the RAIA Observatory developed the web-service presented here, *A Window to the Sea* (Fig.1), (<https://marrisk.inesctec.pt/public/#!/indicators>) that allows users to get information on the current environmental state and evolution of the NW Iberian coastal upwelling ecosystem.

### III. MATERIAL AND METHODS

Data was analyzed and compiled by the various partners of the RAIA Observatory. The development and optimization of the environmental indicators has been done according to the specifications provided by the European Environmental Agency (EEA) and the International Panel for Climate Change (IPCC).

#### IV. RESULTS AND CONCLUSIONS

Current data analysis showed that the Euroregion's ecosystems are in good health, but a follow-up of the time evolution of the indicators is key to detect future changes on them that can be use as early detectors of the vulnerability to specific environmental risks.

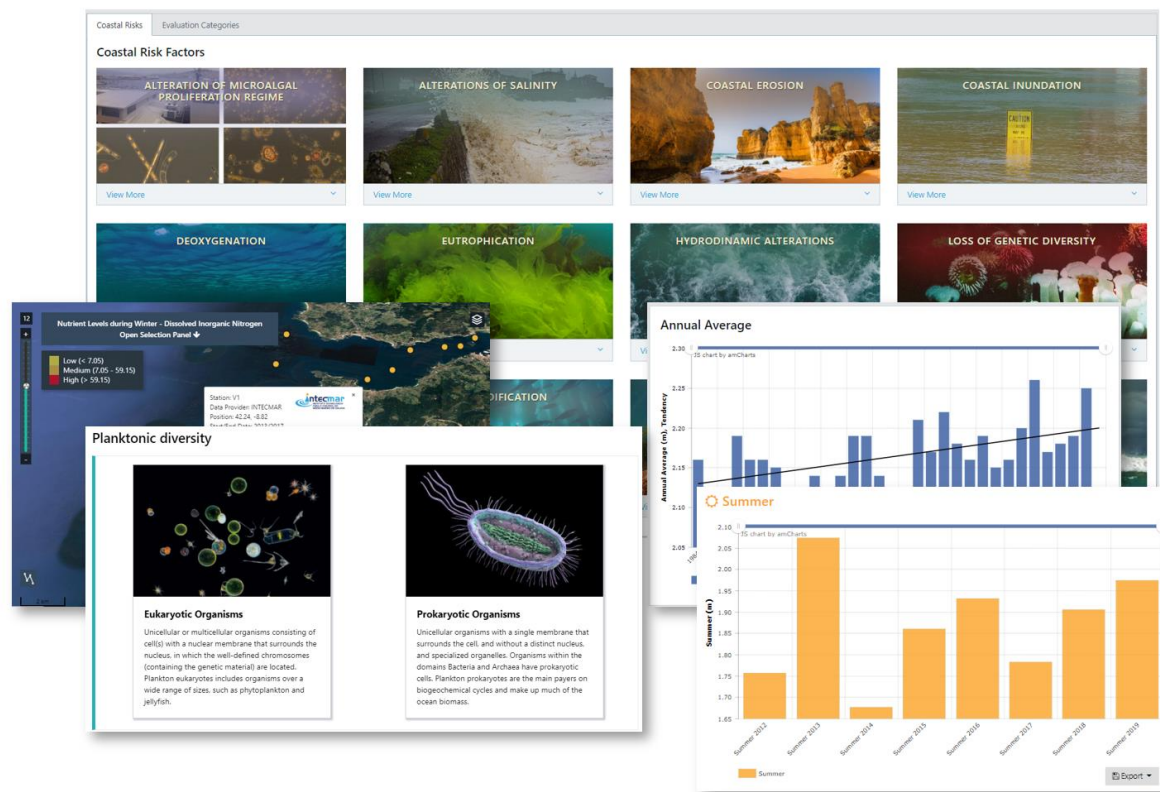


Fig 1. Background: A *Window to the Sea*, web-service of the RAlA Observatory. Images at front are examples of indicators, from back to front: Left) Levels of Dissolved Inorganic Nitrogen (risk of Eutrophication) and Plankton diversity (risk of Loss of Genetic Diversity), Right) Mean Sea Level's annual tendency (risk of Coastal Inundation) and Seasonal mean Significant Wave Height (risks of Coastal Erosion, Coastal Inundation and Overwash).

#### REFERENCES

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