



Supporting the
All-Atlantic Ocean Research
and Innovation Alliance

The Sargassum Challenge

Monitoring and Managing large-scale Sargassum blooms and their ecological and social-economic impacts



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Abstract

Large-scale Sargassum blooms have emerged into a transboundary challenge across the Atlantic, translating it into environmental, economic, and social impacts on coastal ecosystems and communities. Addressing these impacts requires not only robust monitoring systems but also effective mechanisms to communicate scientific information to diverse stakeholder groups in accessible and actionable ways. Through an interdisciplinary and intergenerational collaboration involving ECOPs, senior experts, and international partners, the sargassum challenge explored innovative approaches to enhance stakeholder engagement and improve access to Sargassum information services to allow real time tracking of the blooms.

A multilingual stakeholder survey was conducted prior to the event to identify user profiles, information needs, preferred communication channels, and barriers to accessing existing Sargassum information products. The resulting solution, Sarg'COOM, was conceived as an extension of the Sargassum Information Hub (SIH), integrating Copernicus Marine Service products, location-specific information, stakeholder-tailored content, and an artificial intelligence (AI)-powered virtual assistant to facilitate access to scientifically validated information.

The project demonstrates the value of combining Earth observation data, artificial intelligence, participatory design, and stakeholder engagement to improve the accessibility, relevance, and usability of ocean information services. Rather than creating an additional standalone platform, the proposed solution strengthens the existing SIH ecosystem by promoting a more integrated, personalized, and user-oriented approach to Sargassum communication. The prototype provides a foundation for future operational integration within the SIH and illustrates how collaborative innovation can support the objectives of the All-Atlantic Ocean Research and Innovation Alliance by advancing digital solutions for ocean knowledge, decision-making, and coastal resilience.

Challenge Goal

To co-design an innovative, stakeholder-driven communication solution that enhances access to Sargassum information by integrating user needs, Earth observation data, and artificial intelligence within the Sargassum Information Hub.

Objectives

- Assess stakeholder needs by identifying the information requirements, communication preferences, and barriers experienced by users and potential users of Sargassum information services through a multilingual survey.
- Promote interdisciplinary and intergenerational collaboration by bringing together Early Career Ocean Professionals (ECOPs), Late Career Ocean Professionals (LCOPs), and international experts to jointly develop innovative solutions for Sargassum monitoring and communication.
- Design and develop a user-centred prototype that integrates Earth observation products, localized forecasts, and stakeholder-specific information within the existing Sargassum Information Hub.
- Explore the use of artificial intelligence and digital technologies to improve the accessibility, personalization, and dissemination of scientifically validated Sargassum information to diverse stakeholder groups.

Introduction

The 2026 All-Atlantic Forum, held in Salvador, Bahia, Brazil, brought together policymakers, researchers, international organizations, and civil society representatives to strengthen collaboration across the Atlantic Ocean under the framework of the All-Atlantic Ocean Research and Innovation Alliance (AAORIA). Among the Forum's strategic priorities, ocean observation and modelling, coastal resilience, and sustainable ocean management were highlighted as essential components for addressing the growing environmental and socio-economic challenges affecting Atlantic coastal regions.

Sargassum influxes have become one of the most pressing transboundary environmental challenges across the Tropical Atlantic, generating significant impacts on coastal ecosystems, fisheries, tourism, public health, and local economies (figure 1). While advances in satellite observations, forecasting systems, and information platforms have considerably improved the monitoring of Sargassum events, understanding the needs of end-users remains essential to ensure that available information effectively supports decision-making across different sectors.

Early Career Ocean Professionals (ECOPs) were a key group participating in the intergenerational hackathon that took place before and during the All-Atlantic Forum (figure 2). During this 28 hour hackathon, ECOPs together with Late Career Ocean Professionals (LCOP) advisors worked out a prototype to solve critical ocean science challenges such as the Sargassum. To better understand these needs, a multilingual stakeholder survey was designed by the team, targeting users and potential users of Sargassum information services. The survey sought to identify how different stakeholder groups access information, which products they consider most useful, the challenges they encounter when using existing services, and opportunities for improving the accessibility, relevance, and usability of Sargassum information products. The findings presented in this report provide valuable insights to guide the future development of user-centered information services, including improvements to the Sargassum Information Hub and related forecasting products.



Figure 1. Sargassum influxes in Parrot Tree, Roatán, 2022, Doland McLaughlin



Figure 2. SargCommTeam (ECOPs and LCOPs)

Methodology

Pre-hackathon Survey

A multilingual online survey was developed to assess the information needs, experiences, and priorities of users and potential users of Sargassum information services (Annex 1). The questionnaire was available in four languages (English, Spanish, French, and Portuguese) to maximize participation across the Atlantic region.

The questionnaire explored several thematic areas, including:

- Respondent profile (sector and geographic region);
- Types of impacts experienced due to Sargassum;
- Information needs and preferred forecast horizons;

- Preferred communication channels;
- Barriers to accessing existing information products;
- Importance of forecast uncertainty;
- Awareness and evaluation of the Sargassum Information Hub (SIH);
- Suggestions for improving existing information services.

Webpage development

The website development began on the first day of the Hackathon following the analysis of the survey results. The team was divided into two groups: the first group focused on planning the presentations and designing visualizations to showcase the survey findings, while the second group was responsible for developing the prototype.

Initially, the prototype was conceived as a landing page that would be referenced through the Sargassum Information Hub (SIH). The platform was designed with an interface that would allow users to select a specific region and stakeholder group, enabling information to be displayed according to their particular needs. The content presented would be sourced from the various resources available within the SIH, as well as from the monitoring tools provided by Copernicus Marine Services.

The core development relied on multidisciplinary and inter-generational cooperation of 10–20 Early Career Ocean Professionals (ECOPs) with the strategic mentorship of Late Career Ocean Professionals (LCOPs) from NOAA and the University of Trinidad and Tobago. Facilitated by a Geo Blue Planet coordinator, this multidisciplinary team co-designed a localized communication prototype. The technical architecture integrated satellite-based sargassum detection data layers from the Copernicus Marine Service into Geo Blue Planet's existing Sargassum Hub, while ECOPs from the hosting institution, CiMATEC, applied advanced AI solutions to personalize data delivery by region and stakeholder group.

The first design concept was inspired by the SIH and featured:

- A blue, teal, and white color palette inspired by the ocean.
- A professional, institutional appearance rather than a commercial style.
- Minimal decorative elements to maintain clarity and usability.

Results

Working group meetings

The project team held a series of online and in-person working group meetings throughout the development of the Sargassum monitoring challenge. Initial online meetings were conducted to define the challenge scope, coordinate responsibilities, prepare the user survey, and plan the activities for the 2026 All-Atlantic Forum Hackathon.

The in-person working sessions took place during the Intergenerational Hackathon held in Salvador, Brazil, alongside the 2026 All-Atlantic Forum. Throughout the 28-hour hackathon, (number) of Early Career Ocean Professionals (ECOPs), supported by (number) Late Career Ocean Professionals (LCOPs) and subject-matter experts, collaboratively analyzed the survey results, identified the main user needs and information gaps, and translated these findings into a prototype solution (table 1).

Table1. ECOP and LCOPs team participants

Name	ECOPs/LCOPs	Affiliation
Aleksander Iwanek	ECOP	SIIECS (ICES)
Paola Diaz Canales	ECOP- Honduras Coordinator	IOCARIBE-UNESCO/ (CIMAR)- Universidad de Costa Rica
Maria Angelica Toro	ECOP- Colombia	University of Cartagena/ IOCARIBE UNESCO
Christopher Emilio Enriquez Urban	ECOP	Algrid Technologies
Dr. Winnie N. A. Sowah	ECOP	Department of Marine and Fisheries Sciences, University of Ghana Legon, Accra
Dr. Deanesh Ramsewak	LCOP	The University of Trinidad and Tobago
Xolani Thokozani Zondo	ECOP	University of South Africa
Franziska Elmer	ECOP	seafields solutions/ Sargassum podcast

Naiara Bonfim	ECOP	SENAI CIMATEC
Camille CHERQUES	ECOP - Coordinator	Mercator Ocean International GEO Blue Planet
Craig McLean	LCOP	Retired Assistant Administrator for Research at NOAA

Based on the survey outcomes, the team designed a prototype web platform aimed at improving access to Sargassum information through a more user-centered interface, incorporating recommendations on localized forecasts, communication channels, and user experience. The team also developed a presentation summarizing the identified challenges, proposed solution, and expected benefits, which was delivered during the hackathon pitch session and later presented to participants of the All-Atlantic Forum. These collaborative working sessions enabled the integration of stakeholder feedback into the prototype while fostering interdisciplinary collaboration among participants from different countries and professional backgrounds.

Survey

Our work began prior to the event with the design and distribution of a stakeholder survey. Analyzing these responses during the hackathon revealed that coastal stakeholders preferred direct alerts via WhatsApp or email over static websites. This primary empirical data shifted the project's focus from a basic data portal to a comprehensive, user-centric communication strategy.

[The survey collected responses from 78 participants](#), representing a broad range of stakeholder groups, most respondents were affiliated with the Research and Academia sector (59%), followed by representatives from coastal management, fisheries, tourism, environmental conservation, governmental agencies, and other sectors. Geographically, responses were concentrated in the Western Caribbean (33%) and West Africa (21%) (figure 3), reflecting the regions most actively engaged in current Sargassum initiatives. Overall, the respondent profile indicates a predominance of analytical and scientific users of Sargassum information, while operational sectors such as tourism and fisheries were comparatively less represented.

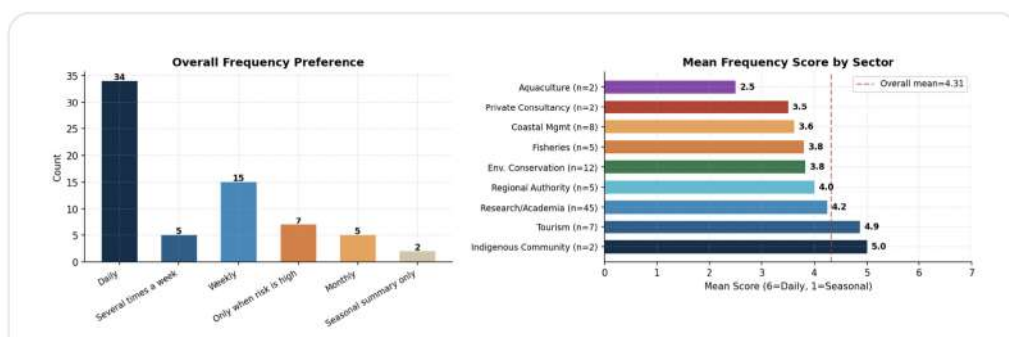


Figure 3. Information Frequency Preferences by Sector: Fishing preferred the most frequent updates, followed by tourism, whereas research and academia showed a broader preference, including weekly and seasonal updates, reflecting their analytical rather than operational use of information

Impacts of Sargassum

Survey responses revealed that Sargassum impacts vary considerably among sectors and regions. Tourism respondents most frequently reported beach access restrictions, unpleasant odors, and income losses, while fisheries emphasized economic losses and increased operational costs. Environmental organizations primarily identified ecosystem degradation as their main concern. Regional differences were also evident. Central America reported the highest overall impact across multiple categories, whereas West Africa highlighted greater dependence on fisheries and associated livelihood impacts.

Information Needs

Daily updates were the most frequently preferred reporting frequency, particularly among operational users such as fisheries and tourism. Respondents generally favored forecast horizons of approximately one week, balancing operational usefulness with forecasting reliability. Information needs were closely linked to experienced impacts. For example, respondents affected by beach closures prioritized localized beaching forecasts, while those reporting economic losses expressed greater interest in information related to Sargassum utilization and commercialization opportunities.

Communication Preferences

Email and websites emerged as the preferred communication channels across nearly all stakeholder groups. Operational users additionally showed strong interest in receiving alerts through WhatsApp, while researchers and coastal managers demonstrated growing interest in conversational Artificial Intelligence (AI) tools for accessing information.

Barriers to Accessing Information

The most frequently reported challenge was that existing information products are too general and insufficiently localized. Respondents also highlighted delays in information delivery, language limitations, and fragmented access across multiple platforms. These findings suggest that future Sargassum information services should prioritize localized forecasts, multilingual dissemination, and simplified access to information.

Forecast Uncertainty

One of the clearest findings of the survey was the importance assigned to forecast uncertainty. Approximately 74% of respondents considered confidence or uncertainty information to be very important, indicating that future forecasting products should prominently communicate forecast confidence alongside prediction results.

Awareness of the Sargassum Information Hub

Approximately half of the respondents were familiar with the [Sargassum Information Hub](#). Awareness was highest among researchers but substantially lower among operational users, particularly within the tourism and fisheries sectors.

Among users familiar with the platform, overall evaluations were positive; however, respondents indicated opportunities to improve usability, information discoverability, and accessibility for non-academic audiences.

Emerging Themes

Analysis of open-ended responses consistently reinforced three major priorities:

- More localized forecasts;
- More frequent and real-time information updates;

- Information tailored to support operational and economic decision-making.

Collectively, the survey highlights the need for user-centered information services that provide geographically specific forecasts, transparent communication of forecast uncertainty, multilingual accessibility, and broader outreach to operational stakeholders.

Development- Web page

Evolution of the Concept

After developing the first version, the team concluded that creating a separate website would contribute to the very problem we aimed to address: the fragmentation of Sargassum-related information across multiple platforms. Consequently, we redesigned the prototype with the intention of integrating it directly into the SIH workflow. To give the project its own identity, we adopted a more technological and modern user interface. The resulting service was named Sarg'COOM (figure 4).

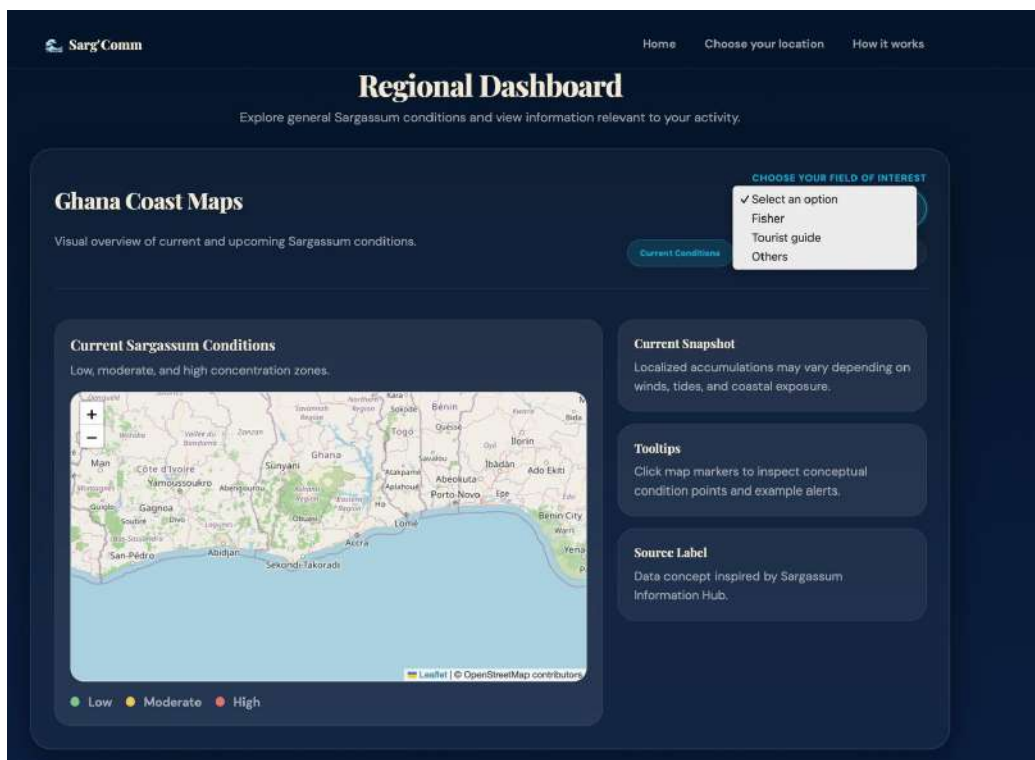


Figure 4. Sarg'COOM webpage

User Experience and Gamification

When users open Sarg'COOM, they are first presented with a short questionnaire. This questionnaire incorporates a gamification approach intended to better understand the user and deliver the most relevant information to the appropriate stakeholder group. The gamified element appears in the second question: instead of answering traditional text-based questions, users interact with images and categorize them into the correct sections. This activity helps us assess the user's knowledge of Sargassum and their underlying interests and motivations for visiting the platform.

AI Assistant: Sargy

On the right side of the interface, users can access Sargy, an AI-powered assistant. Sargy has been fine-tuned using scientifically curated information about Sargassum. Users can interact with it in the same way they would with a standard chatbot, and the responses include appropriate references to reliable sources (figure 5).

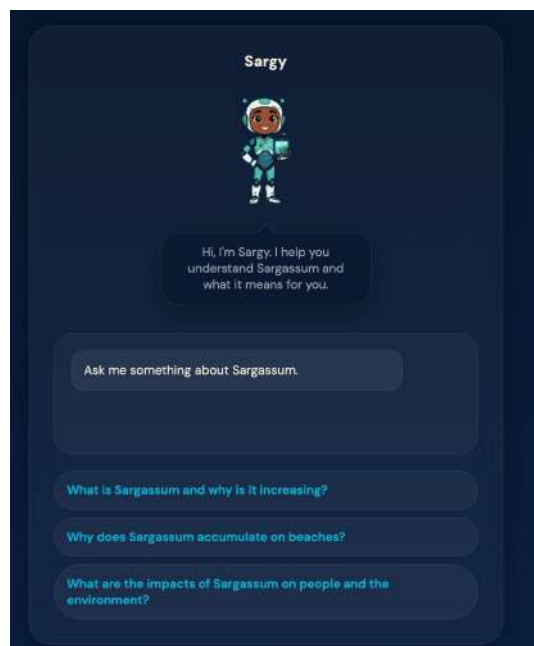


Figure 5. The chatbot interface displaying a user query and a response supported by references to reliable sources.

Location-Based Information

For users who prefer not to use the AI assistant, the platform offers a "Choose your location" section in the navigation menu. This feature guides users to a page where they can first select a region and then a specific country. For the prototype, we selected West Africa, and more specifically Ghana, as the primary use case. Once this location is selected, users are presented with information tailored to their context, including practical indicators such as whether fishing conditions are favorable for the day and current air-quality conditions.

Project Information

The platform includes an informational section describing the project itself and explaining how the website and its underlying technologies work. This section highlights the use of Copernicus Marine Service tools and the integration of the AI assistant within the overall solution. The current chatbot represents a functional prototype developed during the hackathon, with the intention of integrating it into the Sargassum Hub website as part of its future development and user support services.

Presentation and Pitch

The team finalized a functional demo site that in the future will be found within the Sargassum Information Hub and delivered an initial 7-minute technical pitch to a jury panel. This was followed by a condensed 2-minute presentation to high-level international delegates during the formal All-Atlantic Forum sessions, concluding with an official awards ceremony.

2 minutes Pitch

The team collaboratively prepared and delivered a two-minute pitch, which was recognized with the Communication and Storytelling Award (figure 6)

"What would you do with 120 million dollars?"

That is what is spent every year on the Mexican Caribbean coast on Sargassum cleanups. We are talking about the largest algae blooms spreading from West Africa till Mexico. The issue is not the Sargassum but the huge volumes of inundation. They can cause toxic gas and major public health issues. There is a lack of management, care, responsibility, and resources causing socio-economical and environmental impacts. There is information out there, there is ocean data, but it's scattered and too technical. This prevents policy makers from acting. So we, the SarGO Team, created Sarg'COMM, why? because we want to bring the right information to the right people. Sarg'Comm stands for Sargassum Communication and Community. It's a digital platform in the Sargassum Information Hub that centralizes the information and data on past monitoring but also local forecasts. It's customized in local languages. It's user-friendly, tailored to different profiles and data can be found through Sargy, our AI agent. It answers the direct needs from real-world users that we gathered through a survey. We asked the right questions to the right people. Sarg'COMM facilitates accessibility of existing data to turn it into action. It allows fishermen to know where to fish, tourists to know where to swim, coastal managers when to plan cleaning, policy and decision-makers to create laws and policies. Better communication allows engagement and cooperation. Sarg'COMM brings not only information together, but also Atlantic communities. So let's continue this work with AAORIA."



Figure 6. Pitch award SarGo

Conclusion

Following the development of the prototype, we are now planning its integration into the Sargassum Information Hub (SIH). To facilitate this process, we will hold a meeting with the SIH webmaster to discuss the technical implementation and ensure that the platform is ready to go live in time for the Atlantic Summit in Glasgow.

The next stage of development will focus on adapting the user journey to fit seamlessly within the existing SIH ecosystem. This includes adding clear navigation options that allow users to return to the SIH at any point, refining the interface to improve accessibility and usability, and aligning the visual design with the overall SIH experience. In parallel, we will work to understand the server architecture and deployment workflow required to integrate the AI assistant into the production environment.

These final improvements will transform the current prototype into a fully integrated solution that enhances access to reliable, stakeholder-specific sargassum information while strengthening the SIH as a centralized platform for knowledge, monitoring, and decision support.

The Sargassum monitoring challenge demonstrated the value of combining stakeholder feedback with collaborative, interdisciplinary problem-solving to develop user-centered information services. The diversity of expertise within the working group—including participants from different scientific disciplines, technical backgrounds, and regions—enriched both the analysis of the survey results and the design of the proposed prototype. This reflects the inherently multidisciplinary nature of the Sargassum challenge, which requires expertise beyond algal science, encompassing oceanography, coastal management, technology, communication, socioeconomics, and user engagement. The collaboration between Early Career Ocean Professionals (ECOPs) and Late Career Ocean Professionals (LCOPs) further strengthened the process by combining innovative perspectives with experienced guidance, resulting in a more comprehensive and practical solution.



2025

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