



CARICOOS | USER NEEDS ASSESSMENT

CARIBBEAN COASTAL OCEAN OBSERVING SYSTEM

Identification and prioritization of stakeholder needs is essential to expand and improve ocean observing and forecasting services in the US Caribbean region as required for meeting stakeholder needs. To this end, the CARICOOS 2021-2026 strategic planning process has incorporated a comprehensive assessment of stakeholder needs yet to be fulfilled. A variety of approaches, including personal interviews, focus groups and surveys, were employed to identify needs of several user sectors. The table below is not exclusive, as we strive to continuously identify additional stakeholder needs.

Focus Area	Goals	User needs	Core Variables/Examples
Safe and Efficient Maritime Operations	Provide ocean information and decision support tools to enhance safety and efficiency of the full range of maritime operations taking place in the region.	<ul style="list-style-type: none"> • Surface current maps for the San Juan-St. Thomas sea lane. • More resilient High-Frequency Radars (HFR) installations able to withstand a broad range of environmental conditions. • Reduced HFR downtime due to power outages. • Improved circulation and weather data and forecast near ports and harbors. • Real-time metocean data, including profiles of current velocity, to help ensure safe vessel operations around entrances to major seaports in Puerto Rico and the US Virgin Islands. • Simplified visual representations of data and forecasts pertinent to maritime and port operations. • Improved ocean and coastal circulation models. 	<p>Variables: barometric pressure, bathymetry, currents (speed and direction), salinity, waves (height, period and direction), water levels, water and air temperature, wind speed and direction, optical properties of air and water.</p> <p>Examples: solar power systems for HFRs; high-resolution coastal circulation and wind models; data dashboards; among others.</p>
Climate Variability	Document and report variations in ocean properties attributable to regional and extra regional climate processes with the potential to impact marine operations, coastal resources, and increased coastal hazards.	<ul style="list-style-type: none"> • Expand standard and event driven underwater glider deployments to increase the range of physical, ocean biogeochemical and biological data being collected. • Better monitoring techniques to resolve physical and biogeochemical gradients from inshore to offshore waters. • Identify and assess climate-related risks and extreme events at a local scale. 	<p>Variables: temperature, salinity, density, pCO₂, pH, oxygen, DOC, among others.</p> <p>Examples: AUV platforms, remote sensing, discrete water sampling and analysis</p>

Coastal Hazards

Provide coastal information and decision support tools in support of coastal hazard prevention, preparedness, mitigation and adaptation. Continue to expand, as required, the network of observing and modelling assets and capabilities that provide information on coastal weather, waves, currents, water quality, and storm surge inundation.

- Real-time observations of beach conditions that may pose hazards to beachgoers.
- Total inundation maps that include both: storm surge and freshwater inundation estimates.
- Long-term time series of beach evolution and shoreline changes in response to normal and extreme events at critical locations.
- Sensors and/or techniques for tsunami detection.
- Risk-based assessment of climate change and extreme events impacts on coastal zones at a regional scale.

Variables: bathymetry, seabed characteristics, currents (speed and direction), heat flux, salinity, waves (height, period and direction), water levels, stream flow, temperature, wind speed/ direction, contaminants, dissolved oxygen, ocean color optical properties, total suspended matter, barometric pressure, rainfall.

Examples: UAVs for shoreline monitoring, webcams for beach conditions, among others.

Coastal Resources: Monitoring and Management

Provide data products and services to aid state/federal agencies and NGOs in their mission of supporting Caribbean coastal ecosystems' health, living marine resources, and water quality.

- Bottom water quality and physical properties data collection
- Monitor and assess marine debris and microplastics in the ocean and coastal areas.
- Assessments of the health and effectiveness of coastal barriers in shoreline protection and their vulnerability to climate variability (e.g., sea level rise, increases in ocean temperature, pollutants, and ocean acidification).
- Identify and emplace additional observational and modeling assets to support ecosystem management and restoration efforts.
- Fish monitoring and/or marine mammal tracking.
- Assessments of benthic assemblages and structure.
- Spatio-temporal assessments of nearshore water quality.
- Tracking and forecasting Sargassum blooms and beaching events.

Variables: bathymetry, seabed characteristics, currents (speed and direction), heat flux, salinity, waves (height, period and direction), water levels, stream flow, temperature, wind speed and direction, ocean acidification, DOC, FIB, pollutants, dissolved nutrients, dissolved oxygen, ocean optical properties, total suspended matter, marine and ecosystem diversity and abundance, phytoplankton species and abundance, soundscape, zooplankton species and abundance.

- Advance IOOS biological observing component through biological data stewardship activities in the US Caribbean region.
- Ecosystem biomonitoring
- Satellite-based water quality virtual buoys
- Better understanding of marine organism dispersal patterns.
- Better understanding of emergent coral diseases and their relationship to the dynamics of the coastal environment.
- Increased frequency and extent of beach water quality monitoring.
- Monitoring of hotspots and quantification of H₂S emissions by Sargasso
- Monitoring the impact of Sargasso on turtle nesting sites and other critical habitats.

Examples: eDNA; water quality buoys or platforms; instrumented FADs; H₂S sensors; turtle nesting distribution maps; among others.