



CARICOOS Beach Water Quality and Pa' la Playa Beach APP

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LONG-TERM GOALS

CARICOOS beach water quality efforts aim at developing decision-support tools to provide timely and accurate information to beachgoers and coastal managers across the region regarding beach water quality in their locality. This initiative is part of the CARICOOS Coastal Hazards Focus Area, as well as its Observational and Modeling Subsystems, and is well aligned with CARICOOS goal of integrating observations and models into coastal intelligence for the US Caribbean region.

The CARICOOS Pa' la Playa Beach App aims at providing accurate weather, waves and water quality information for 100+ beaches around PR and the US Virgin Islands in a simple, reliable, and easy-to-use mobile interface.

MILESTONES / OBJECTIVES

- A. Maintenance and further development of CARICOOS Beach Water Quality products.
- B. Develop new beach water quality nowcasts using weather radar data.
- C. Maintenance of the CARICOOS Beach App.
- D. Include USVI beach water quality data as part of CARICOOS data products.

WORK COMPLETED

- A. Maintenance and further development of CARICOOS Beach Water Quality products.

[CARICOOS Beach Water Quality products](#) now include three different maps: the LATEST SAMPLE map, the NOWCAST map, and the RATINGS map (Figure 1,). The former provides water quality data from Surfrider/CARICOOS, JCA, and Blue Flag; while the latter provides a percent value corresponding to the amount of times each beach has resulted in below-limit water quality results during the previous three months. The NOWCAST map provides a percent probability that the beach water quality is within acceptable levels (see next section). All beach sites include info boxes with additional data and a link to the historic data set. Weekly maintenance of these products is up-to-date.

Additionally, a new effort is underway to incorporate additional beaches on the LATEST SAMPLE MAP and/or increase existing sampling frequencies. Coordinated mainly by Dr.

Yasmín Detrés, three NGOs have been engaged to develop their own water quality testing facility. Supported by CARICOOS, these groups will receive equipment loans and funds for supplies and labor costs. At the moment, all three groups (Sociedad Ambiente Marino, Fideicomiso de Conservación e Historia de Vieques, and Taller Ecológico) have been trained on the IDEXX method and are in the process of developing quotes to perform the water sampling activities.

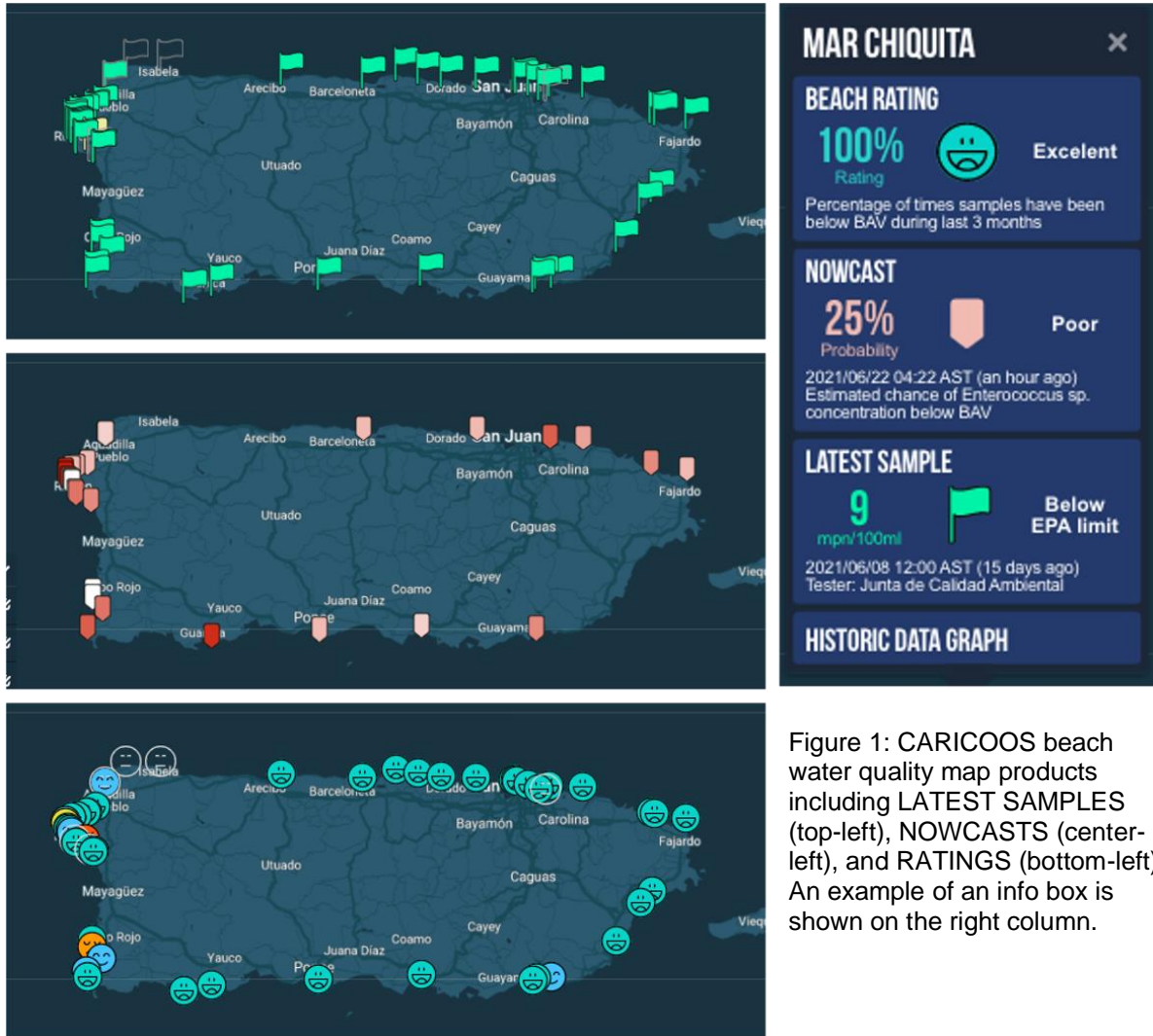


Figure 1: CARICOOS beach water quality map products including LATEST SAMPLES (top-left), NOWCASTS (center-left), and RATINGS (bottom-left). An example of an info box is shown on the right column.

B. Develop new beach water quality nowcasts using weather radar data.

Given the well-documented dependency between bacteria levels in nearshore waters and local precipitation, an analysis spanning eight years of weather radar data was performed in order to produce precipitation-based estimates of beach water quality. One-hour precipitation totals from the NEXRAD TJUA site at Cayey, PR were used to accumulate 24-hr precipitation totals for a 20x20 km grid surrounding each beach site. Spatial averages of accumulated precipitation were evaluated against JCA/Surfrider data to detect precipitation thresholds that showed a marked increase in MPN exceedances (Figure 2, top). These thresholds were used to build the contingency matrix shown in Figure 2 (right-column).



Operational scripts were then developed to report the estimated chance of MPN concentrations below Beach Action Value (BAV = 70 CFU/100mL):

- MPN < BAV when 24-hr precipitation > threshold: B/(B+D)
- MPN < BAV when 24-hr precipitation < threshold: A/(A+C)

Of the 69 sites analyzed, 33 were chosen for caricoos.org based on the goodness of the statistics characterized by a hit rate above 80% (Figure 2, center-left). The total number of data points used on each site is shown in Figure 2 (bottom-left).

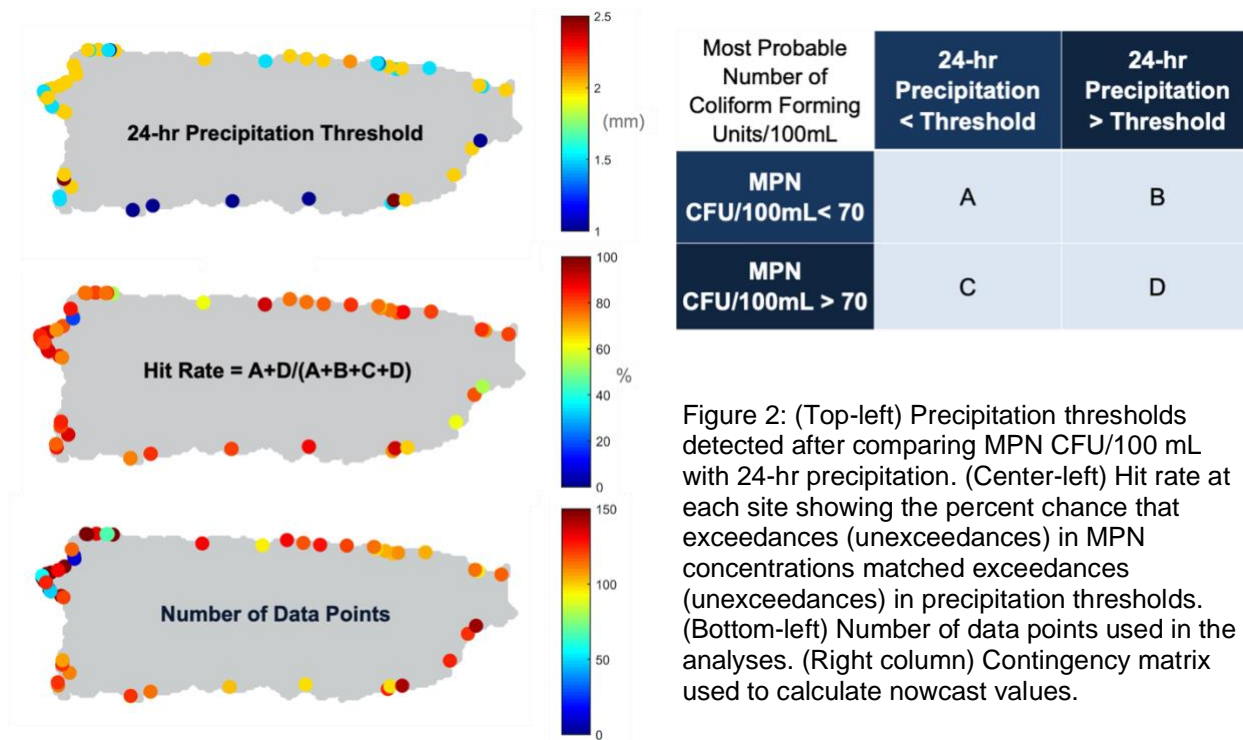


Figure 2: (Top-left) Precipitation thresholds detected after comparing MPN CFU/100 mL with 24-hr precipitation. (Center-left) Hit rate at each site showing the percent chance that exceedances (unexceedances) in MPN concentrations matched exceedances (unexceedances) in precipitation thresholds. (Bottom-left) Number of data points used in the analyses. (Right column) Contingency matrix used to calculate nowcast values.

As of today, the script is running hourly on a local computer.

C. Maintenance of the CARICOOS Beach App.

Nothing to report. Maintenance up-to-date.

D. Include USVI beach water quality data as part of CARICOOS data products.

Delayed. Data sources have been identified. Ingestion into the CARICOOS Beach Water Quality Products will take place during the no-cost-extension period.

MAJOR OUTCOMES

CARICOOS Beach Water Quality program now includes three different tools to aid in the decision making: the LATEST SAMPLE map, the new NOWCAST map, and the RATINGS map. Our nowcast capabilities have now increased from two sites (Rincón and Playa Santa) to thirty-three sites around the entire main island.



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CARIBBEAN COASTAL OCEAN OBSERVING SYSTEM

RELATED PROJECTS

There are no related projects to report.

WORK PLAN FOR UPCOMING PERFORMANCE PERIOD (June 1, 2021 – November 30, 2021)

- A. Maintenance and further development of CARICOOS Beach Water Quality products (x-y plots for historical data, new data sets from NGOs).
- B. Maintenance of the CARICOOS Beach App.
- C. Include USVI beach water quality data as part of CARICOOS data products.