Cyanobacteria Assessment Network (CyAN) mobile app helps water quality managers make faster decisions about treating harmful algal blooms

EPA scientists are developing the Cyanobacteria Assessment Network (CyAN), a mobile app that uses satellite data to map the location of harmful algal blooms in fresh and coastal waters across the U.S. The app is being designed for Android phones, and will provide rapid information about cyanobacteria concentrations in U.S. water bodies that can be used to inform decisions regarding beach and drinking water safety. Collaborators in this research are NASA, NOAA, and USGS.

The trouble with cyanobacteria

Cyanobacteria, or harmful algal blooms, appear frequently during warm weather months across the country and are an indicator of poor water quality with potentially serious health impacts. Cyanotoxins in recreational and drinking water can affect humans, domestic animals and wildlife, causing respiratory or skin irritation and even illness.

Historically, monitoring cyanobacteria blooms has been labor intensive and limited due to cost, time, and logistical constraints. To collect data for the app, EPA is collaborating with other federal agencies including NASA, NOAA, and USGS. The primary satellite sensor collecting data is the European Space Agency Sentinel-3 Ocean and Land Colour Imager.

An example of how users can drop location pins in water bodies and how the pins change colors depending on user settings (left). Users can set their own thresholds for cyanobacteria cell counts since states and localities address these harmful algal blooms differently (right).

How CyAN can help

CyAN addresses these issues by giving its users near-real time satellite data about the severity of cyanobacteria blooms within a free and easy-to-use mobile app.

To collect data for the app, EPA is collaborating with NASA and USGS, who each have satellites that feed information to CyAN. The primary satellites collecting data are MODIS (NASA) and Landsat (USGS/NASA).

The satellites track cyanobacteria concentrations, which are an indicator of how toxic a particular algal bloom has become. By dropping "pins" on water bodies they want to monitor with the app, users can view cyanobacteria concentrations on a national scale, or zoom in to single-out data for a particular lake or reservoir. Since states and localities address harmful algal blooms differently, users can determine their own

thresholds for cyanobacteria concentrations within the app. When satellites detect that concentrations reach user-defined thresholds, pins in the app change colors. Green pins indicate the lowest threshold, yellow and orange pins indicate moderate levels, and red indicate high concentrations of cyanobacteria. Users can also compare pins in multiple water bodies at once, allowing them to make better-informed decisions based on near-real-time changes at specific locations.

Lake managers, for example, could use CyAN on a weekly basis to monitor lakes in their region. At a quick glance of their cell phones, they could pinpoint potential problem areas and focus their attention and resources there. Having this data might prompt them to manually collect water samples from certain lakes for more information, or issue a public advisory that closes local shores to recreation.

In addition to near-real time data, CyAN will feature a rolling three-month period of archived data, so users can compare how conditions may have changed over recent history. Having archived data available means water quality managers can more closely estimate the rate of change in a water body, a big advantage in the prediction and mitigation of harmful blooms.

Current & future progress

Initial testing of CyAN has been conducted using satellite data for Florida and Ohio, where low to moderate cloud cover allows high quality images to be gathered consistently.

EPA hopes to eventually take CyAN nationwide. By 2019, Android users should be able to download the app for free through GitHub and the Google Play Store. There are currently no plans to develop the app for iOS.

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