Clean Lakes Alliance Mission

Clean Lakes Alliance (CLA) strives to improve the quality of the lakes, streams, and wetlands of the Yahara River watershed by building partnerships with diverse stakeholders and raising awareness of the challenges facing our public waterways. We see a future in which everyone realizes that our lakes are the center of our community.

Project Overview

In 2014, a CLA-administered lake user survey revealed that the dynamic nature of the near-shore environment makes it difficult for citizens to know when and where water quality is most favorable for recreational purposes. One beach covered in unsightly blue-green algae might be within a mile of another cleaner beach, yet lake users are left largely unaware of these variable and ever-changing conditions. This lack of access to information perpetuates damaging myths about water quality. Furthermore, it leaves lake users guessing what conditions they might encounter upon their visit to any particular beach or lake access point.

In concert with our efforts to raise awareness and build citizen involvement in water quality issues, CLA began conceptualizing and developing a mobile-ready website in 2014. The purpose of the site was to provide lake users with access to near real-time water quality information as observed around each of the five Yahara lakes. By using the site's data and intuitive maps, users can avoid potential health hazards and make more informed decisions on where to recreate.

This year, in partnership with MIOsoft, UW Center for Limnology, Public Health, Wisconsin DNR and others, CLA was able to improve the design and functionality of Lakeforecast.org, officially launching the site to great fanfare over the summer. At the end of the 2016 monitoring season, the site had accumulated almost 50,000 page views.

Today, Lakeforecast.org serves as a data "hub" for CLA's citizen water quality monitoring program, reports official beach closures as they occur, and even provides access to offshore water quality conditions recorded by UW-owned monitoring buoy. Volunteers and city lifeguards are now able to submit water quality measurements and observations by smartphone or desktop computer. In turn, these reports are made instantly available to all Lakeforecast.org users, with data summaries displayed alongside historical observations to show how near-shore conditions are changing over time. Eventually, we hope the site becomes the community's source for near-shore lake conditions and a gateway to greater involvement and investment in our lakes.

Partnerships

CLA sought the collaboration of several organizations to bring Lakeforecast.org to its full potential. From the inception of the site to September of 2015, CLA sought the expertise at

MIOsoft to make Lakeforecast.org a reality. The MIOsoft team donated 755 hours of web development and design services to this project.

Other partnerships were established to furnish the mobile-ready website with timely and accurate information. RSS feeds from University of Wisconsin's Center for Limnology (UW CFL) and Space Science and Engineering Center (UW SSEC) provide offshore data from the Lake Mendota Buoy and the university weather station, respectively, supplementing near-shore water quality data to give site users a more complete picture of lake conditions. UW CFL staff devised an algorithm that correlates phycocyanin readings from the buoy with water clarity, allowing users to see the approximate water clarity at the buoy. Beach-closure information garnered by Public Health Madison & Dane County (PHMDC) is also fed to the site through an RSS feed. Both the UW CFL and MIOsoft joined CLA in promoting Lakeforecast.org through blog posts and television interviews when it was officially launched this past summer.

CLA has made the data collected through Lakeforecast.org available to UW researchers Paul Block and Caitlin Soley, thereby facilitating the investigation of seasonal predictors of blue-green algal blooms. In addition, data has been shared with UW professors Chin Wu and Richard Lathrop, Dane County engineer John Reimer, and retired public health microbiologist Jon Standridge in an effort to evaluate patterns and casual relationships related to changes in clarity and algal presence.

Awareness

CLA undertook several efforts to build awareness of Lakeforecast.org among potential lake users and the Madison community. A public launch of the new website took place on May 5th, 2015, coinciding with the *Save Our Lakes* Community Breakfast held at the Monona Terrace Convention Center with over 700 attendees. From May to August of 2015, Lakeforecast.org attracted the attention of several local media outlets. Below is a summary of this past summer's media exposure:

- May 5th , WKOW ABC 27 released a news article
- July 30th, UW CFL issued a press release
- July 30th, Madison.com published an online article
- July 30th, WISC-TV (Channel 3000) aired a television segment
- July 30th, WKOW ABC 27 aired a television segment
- August 4th, the Sun Prarie Star released an article
- August 6th, NCB 15 aired a television segment

Lakeforecast.org was also promoted at CLA events whenever possible. These events included lifeguard and volunteer monitor trainings, Yahara Lakes 101 science café series, CLA Community Board meetings, Volunteer Day events with local businesses, and the annual Clean Lakes Festival held at Law Park. Functionality of the website was demonstrated at a November 12th, 2015, community presentation held at The Edgewater Hotel. In addition, this initiative will

be featured as part of a talk that will be given at the 2016 Wisconsin Lakes Convention held in Stevens Point.

Site Layout and Data Sources

Lakeforecast.org primarily relies on data collected by CLA's volunteer citizen monitors, with other real-time data accessed from partners' sites. Once a monitor logs in, the data submitted during that reporting session is automatically tied to their unique monitoring site. Website users can then see a map overview of all public beaches and individual monitoring stations. A thumbs-up or thumbs-down graphic shows whether a beach is open or closed, whereas the color of the graphic provides an indication of the most recent water clarity reading at that location. Clicking on a site brings visitors to a page with historical data for that site, along with a narrative description of amenities, if applicable.

Volunteer monitors make three quantitative measurements and seven qualitative observations per monitoring event. Air temperature and water temperature are measured with a waterproof digital thermometer, while near-shore clarity is measured with a 120-cm turbidity tube. Monitors then make observations on algal presence, algal type (green or blue-green), plant debris, bather load, wave intensity, waterfowl presence, and general water clarity. Historical changes related to each of these parameters can be viewed through graphs available for all monitoring stations.

Lakeforecast.org regularly scrapes data from the Lake Mendota buoy, located at the deep hole (almost a mile northeast of Picnic Point). Real-time measurements of air temperature, dew point, wind speed and direction, and water temperature at the surface and 1-meter depth appear on the buoy's site page with a narrative description. Water clarity calculated by phycocyanin readings is displayed on the Lakeforecast.org home page, along with beach closure status from PHMDC. Other weather parameters from the UW SSEC meteorological station are also displayed.

Recommendations and Future Goals

To enhance the value of both the website and future monitoring efforts, work will continue in expanding the role of municipal lifeguards in data collection and reporting. The aggregating of monitoring events to coincide with the timing of specific weather conditions (i.e., rainfall, calm or gusty winds, high-degree days, etc.) is also recommended. This type of coordinated, event-based monitoring can offer better "snapshots in time" on how near-shore water quality is spatially impacted by different weather variables, including the formation and movement of blue-green algal blooms.

Additional recommendations include partnering with other monitoring organizations, such as the Rock River Coalition, U.S. Geological Survey and Wisconsin DNR, to try to incorporate and share more surface water data sources with the public. CLA also hopes to continue improving the look and functionality of the website, namely so it becomes increasingly intuitive in terms of its use and navigation for both the reporting monitors and the end user.

Ultimately, one of the primary aims of CLA is to encourage greater use and enjoyment of our lakes. Improved awareness of and concern for the issues facing our lakes will stimulate public and private investment in Madison's greatest shared resource. We hope that Lakeforecast.org will help turn casual lake users into advocates for management strategies that acknowledge the true value of clean water. Besides helping lake users plan their next beach visits, Lakeforecast.org will spark an interest in lake science and spur individual action by linking users to other information and resources.

In the future, Lakeforecast.org will become more inclusive and contain true crowd-sourced data, allowing anyone to log observations of near-shore conditions. Visitors will also be able to upload photos, turning Lakeforecast.org into something more like a community portal than a simple data repository.