

2016 CA Water Board Data Innovation Challenge

March 18-April 22, 2016

The Water Boards' Office of Information Management and Analysis (OIMA) is hosting a [Data Innovation Challenge](#) this spring. The focus will be on creating apps, visualizations, and other tools that can help better harness data that is currently available. Generally, state government projects and products fail to share; disseminate; or make use, to its potential, the large amount of data that the government itself maintains. One of the aims of this event is to create products that demonstrate the use of data beyond what is currently being done. Data from the Water Boards' CEDEN, SMARTS and CIWQS databases (see below) will be highlighted, but finding synergies with other datasets is encouraged and will be considered during the evaluation of the event entries.

This event also kicks-off the first phase of the Water Boards' Open Data Initiative, which includes making data from three systems available through an open data platform. Future phases will include adding additional datasets and the development of additional tools for enhanced data access, integration, and visualization.

What is a Data Innovation Challenge ?

A Data Innovation Challenge (also known as an apps challenge or codefest) is a competition of brainstorming and computer programming that draws together the talent and creativity of software developers and designers.

How do I participate?

The event will be kicked off by the Water Boards' [Data Fair](#) on March 18, though attendance (in-person or virtually) at the Data Fair is not necessary to participate in the Data Innovation Challenge. The goal of the Data Fair is to provide information on the Water Boards' data systems and data initiatives, give access to some of the data stewards of the available datasets, and generally bring awareness to the importance of data as the Water Board fulfills its mission of preserving and enhancing Waters of the State. Then, during the intervening month, brainstorm ideas on how to address one of the questions within or related to the themes, below; code; and enter the competition!

Competition participants must submit their product by 5:00 pm on April 19. Specific instructions on submitting products will be provided in the coming weeks on the [Data Innovation Challenge website](#). Participants must be available in-person or via web conference on April 22 to give a brief presentation on and demonstration of their product.

What datasets will be available?

The California Environmental Data Exchange Network (CEDEN)

The CEDEN database contains field, chemistry, sediment and water column toxicity, tissue, taxonomy and benthic data. The data are collected by a large variety of environmental monitoring programs throughout California that monitor streams, lakes, rivers, and the coastal ocean. It includes quality assurance-related data.

Stormwater Multiple Application and Report Tracking System (SMARTS)

The SMARTS database primarily houses regulatory data (such as what sites are covered by a permit, when permit coverage began at the site, the dates of Water Board inspections, and the number and types of violations found at regulated sites) for the statewide general construction, industrial and small municipal stormwater permits. It also contains stormwater quality data for those sites that file their annual reports electronically.

California Integrated Water Quality System Project (CIWQS)

CIWQS is used by the State and Regional Water Quality Control Boards to track regulatory information about other programs, such as the National Pollution Discharge Elimination System (NPDES) permits and waste dischargers to land. It also contains self-monitoring report data generally submitted by NPDES dischargers and sanitary sewer system spill data submitted by sanitary sewer system operators.



Themes and Questions

Climate Change Adaptation Challenges

Preparing for the impacts of global climate change will require fundamental shifts in how the water-quality management community engages in long-term planning, sets its strategies, and establishes priorities. Although numerous federal, state and local agencies have released reports offering insights into various facets of climate change, most of these focus on terrestrial ecosystem impacts. The wastewater dischargers, storm water management agencies, groundwater and water supply managers and water-quality regulators of California have looked at facility vulnerability but when it comes to water resource and quality management implications they do not have a document that focuses on what they can be doing to prepare, offset and mitigate local and regional impacts. Given the pace at which climate change is occurring, it is incumbent upon water-quality managers to have the data and modelling that they will need for regulatory and policy efforts over the near and long terms.

- 1) **Changing water acidity:** As the world's oceans absorb increased atmospheric CO₂ and pH falls, oceans are becoming more acidic at an alarming rate – almost 10 times faster than at any other time over the past 50 million years.
 - a. Using our datasets and others, what are the implications of this expected change?
 - b. What can we do to adapt better to this expected change?
- 2) **Changing sea level and storm surge:** As polar ice caps melt, median sea level is projected to rise by another foot or more over the next 35 years, and storm surge could become more severe and frequent.
 - a. Which facilities regulated by the Water Boards are in the most vulnerable areas of the State?
 - b. How should we prioritize our compliance evaluation and enforcement priorities to properly respond to facilities and their related fee-payer needs?
- 3) **Changing surface water flow patterns:** As rainfall patterns change, dry areas are expected to get drier and rainy seasons are expected to become shorter and more intense. In addition, snow melt will occur earlier, further altering river flow patterns.
 - a. Where can we expect the most biological effects of this change in rainfall amount and pattern across the State?
 - b. What happens to high mountain meadows and transitional areas in our Sierra mountain range and Coast range with these changes?
- 4) **Changing water temperature:** As global atmospheric temperatures gradually rise, the water column temperature has been increasing about 15 times faster than at any other time in the past 10,000 years.
 - a. Has river and lake temperature changed much already?

Regulatory Oversight Challenges

One of the primary functions of the Water Boards is to regulate discharges of waste that may impact surface or ground water quality. This includes issuing orders and permits, conducting inspections, assessing compliance, and pursuing enforcement. It is assumed that these efforts protect the State's waters, but we have little evidence on which to base that conclusion. Through our annual Performance Measures report, we measure *outputs* of our regulatory efforts, but have yet to widely demonstrate the *outcomes* of these efforts.

- 1) Do bioassessment measures, such as the California Stream Condition Index (CSCI), correlate with the number of violations recorded that are associated to the given location?
- 2) Do enforcement actions change water quality?
- 3) What tools that encourage citizen participation help in our goal of associating regulatory activity with water quality outcomes?

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Societal Water Quality Challenges

Many of today's challenges are related to human behavior, some of which may or may not be unique to residents of California. For example, trash is a major problem equating to about \$13 per resident per year in costs to control this problem. The Water Boards are implementing a new program to control more trash, estimated to cost about another \$4-5 per resident per year. This is an important, global problem that California is trying to solve, both for the oceans and the many miles of inland waterways that are impacted by trash. But we don't have a lot of information on how much of a trash problem we have. Similarly, residents of California consume many products that directly impact water quality, both in terms of topical products (like lotions, shampoos, etc.) and ingested ones (pharmaceuticals, etc.). This broad category of pollution problems is referred to as constituents of emerging concern (CECs). Some of the examples of efforts to address these include a recent legislative [ban](#) on microplastics in future California products. The facilities that discharge these into our waters are working hard to set up a screening method to identify problems to both human and aquatic organisms. Some of the following questions may be addressed using our existing datasets, especially when combined with other data and information available around the state, country and world.

- 1) Using our datasets and others, how much trash comes from different parts (cities, facilities, regions) in California?
- 2) Does trash differ by region, city, and socioeconomic factors?
- 3) Do all Californians seem to consume the same amount of pharmaceuticals or CEC indicators related to pharmaceuticals?
- 4) Are indicators of human waste (e.g., caffeine) available in our datasets that, along with other information, could be used to better detect and describe the CEC problems in our waters?

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