

California Sets the Stage for Comprehensive Groundwater Management

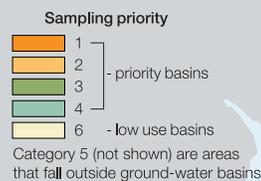
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California groundwater basins (colored), ranked in order of sampling priority (from Belitz et al., 2003).

In the past seven years, California's groundwater management has made great strides with the adoption of legislation followed by the design and implementation of a statewide comprehensive groundwater-quality monitoring program. But much work remains before a comprehensive understanding of the groundwater resources can be achieved. As the state that pumps the most from the ground—18 percent of the total national extraction (Huston et al., 2004)—it would seem appropriate for California to lead the nation in understanding its groundwater resources.

A report by the Natural Resources Defense Council (NRDC, 2001) was the catalyst for the new comprehensive monitoring program. The report concluded that California's groundwater basins were significantly contaminated by several major sources, but that available information was often of dubious quality. NRDC recommendations included:



- 1) instituting an ongoing, more systematic monitoring program involving the relevant state agencies, including standardizing the format of collected data;
- 2) assigning to a single state agency the responsibility for compiling and making groundwater data available to the public; and
- 3) ensuring adequate state agency funding for groundwater.

This publication spurred the adoption of California's Groundwater Quality Monitoring Act of 2001 (Assembly Bill 599), which authorized the State Water Resources Control Board (SWRCB) to develop and implement a comprehensive groundwater quality monitoring and assessment program now incorporated into SWRCB's Groundwater Ambient Monitoring and Assessment (GAMA) Program. As required by AB 599, the program was developed through a public process involving an interagency task force and a public advisory committee, which met regularly over an 18-month period. During that time, SWRCB prepared a report to the Governor and Legislature (SWRCB, 2003) and contracted with the U.S. Geological Survey to prepare a technical plan for the program (Belitz et al., 2003).

SWRCB's report showed spottiness of monitoring locations and inconsistencies in the types of groundwater quality analyses being undertaken throughout the state, indicating inadequate coordination of effort among the agencies collecting the data. A large amount of federal, state, and local water-quality data relevant to basin assessment had been collected, but these data had not been centralized into a digital database. Further, the state's Department of Health Services (DHS) database on water quality for public-supply wells was found to be the only statewide, digital water-quality database available at the time SWRCB prepared its report.

What Wasn't Addressed

A complication that SWRCB's report did not address is that groundwater is not regulated or permitted in the

state of California. Generally, anyone who owns a piece of land can install a well and start pumping. The lack of permitting and regulation breeds sensitivity and opposition to proposals that would require widespread reporting of groundwater quality, levels, or pumping.

Another complication not mentioned in the report nor discussed in the public process is the issue of well drillers' log confidentiality. The logs contain information on location, lithology, well construction, and depth to water, and are considered confidential and proprietary in California, the only state to have this provision. Consequently, this information cannot be obtained from the California Department of Water Resources, which manages the reports, unless the requester is a public agency or under direction for a contamination cleanup. Furthermore, this confidentiality must be maintained in reports and documents unless or until releases are obtained from well owners: a formidable task for hydrogeologists!

Finally, the SWRCB report and public process did not thoroughly address the issue of improving communication and involving local agencies in the statewide groundwater quality monitoring program.

Monitoring and Assessment Begins

Primary goals of the GAMA Program are to produce groundwater basin assessments that: describe constituents affecting groundwater quality; identify trends in groundwater quality; identify emerging constituents of concern; relate groundwater quality to human and natural factors; and identify data gaps. The program prioritizes 116 of California's 515 groundwater basins for assessment, based on groundwater use. These 116 basins account for 76 percent of the state's public water supply wells, 98 percent of municipal groundwater use, 88 percent of agricultural pumping, 74 percent of leaking underground fuel tanks, and 71

percent of square-mile sections of land with pesticide use (Huston et al., 2004).

California has committed nearly \$12 million to the assessment of 44 of these priority groundwater basins (38 percent), and under a full services contract to the SWRCB, the USGS commenced groundwater sampling field work in June 2004. Prior to implementing the program, the SWRCB and USGS are supposed to coordinate with stakeholders, including state and local agencies and local water purveyors. The full statewide program of sampling 116 of the 515 groundwater

basins and sub-basins is estimated to be a \$50 million, 10-year effort, excluding future decadal and triennial trend monitoring.

The program focuses primarily on public-supply wells in basins where groundwater is an important source of drinking water and utilizes water-quality data already assembled

in the DHS database for regulatory compliance. Additional water samples from public-supply wells and domestic-supply, irrigation, and monitoring wells will be collected as needed. An estimated 3,000 to 3,200 wells will be sampled statewide to provide complete spatial coverage of the priority basins. The proposed network of wells will be used to assess the status of the groundwater resource, assess trends in water quality, and provide a basis for understanding the factors that affect water quality.

The overall approach largely follows the USGS National Water Quality Assessment (NAWQA) program, which provides guidelines for broad-scale assessments of groundwater quality and for detailed studies of the effects of land use on groundwater quality. For example, sampling density was targeted to be one well per 25 square kilometers, midway between NAWQA's recommendations for broad-scale and detailed assessments.

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or other means are rarely successful because using local water exacerbates the problem. Therefore, mitigation also requires that alternative water sources be available to the water users.

Conservative Approach Warranted

Regarding the proposed groundwater transfer, the best decision may be to minimize the risk by granting only those water rights for which a high degree of certainty exists that their use will not impact springs and wetlands. Because recharge estimates are among the most uncertain of any parameters in the basins targeted for development, acceptable risk reduction may mean that only a few tenths of the currently projected perennial yield should be allocated initially. Long-term monitoring—on the order of multiple decades—may be required to ensure that the water right can safely and sustainably be increased in the future.

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Reference

Winograd, I.J. and W. Thordarson, 1975. *Hydrogeologic and hydrochemical framework, south-central Great Basin, Nevada-California, with special reference to the Nevada Test Site. Hydrology of Nuclear Test Sites, Geological Survey Professional Paper 712-C. U.S. Geological Survey, Washington D.C.*

Further, as previously indicated, the Nevada State Engineer’s authority over groundwater does not end when a permit is issued. His primary interest is the responsible, sustainable use of Nevada’s groundwater supplies, which is in the best interest of Southern Nevada as well.

The assertion that information about the regional carbonate aquifer is not sufficient to allow carefully controlled, monitored withdrawals is a ploy intended to create a Catch-22. The idea behind this tactic is that water should not be permitted because there is not enough hydrologic information, while the absence of pumping precludes the gathering of such data.

An ongoing groundwater-monitoring program will answer the questions that form the core of anxiety about this project. That program can only be implemented once the SNWA begins withdrawing water from the system—water that the Nevada State Engineer has ample evidence exists.

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constituents, which include environmental tracers, such as stable isotopes of water and tritium/helium age-dating, and low-level concentrations of volatile organic compounds. The other half are being sampled for the basic constituents as well as an expanded schedule of constituents, including field parameters (pH, electrical conductance, dissolved oxygen, alkalinity, and temperature), major ions, trace elements, pesticides, and emerging contaminants.

The program aims to have online data reports available by basin, posted on the SWRCB Geotracker data management system website within four months of completion of sampling. Interpretive reports are expected to be available nine months following the data reports.

Bumps in the Road

The GAMA program has been somewhat challenged since its inception. Several groundwater management agencies have cited a lack of coordination that has led to some miscommunication, misunderstanding, frustration, and lack of cooperation. The issue of collecting

data at the part-per-trillion level also has raised concerns: What do the data mean in terms of future groundwater quality, human and ecologic risk, public perception and uncertainty, and districts’ potential liability for serving water with these extremely low levels of constituents? Another concern is interpretation of these low-level groundwater analytical data, which are not representative and are much lower than drinking water maximum contaminant levels. One groundwater management agency believes the low-level data are being mischaracterized and sensationalized in the reporting, leading to concerns about how and by whom these data will be interpreted and used.

Although California has made considerable progress with its groundwater data programs in the last few years, the road ahead is long, especially regarding the coordination of state, local, and federal programs. Even with the GAMA program, multiple agencies still collect and manage their own data according to different standards. Given the importance of this public and private resource on the state economy and public health, Californians

will need to keep forging ahead to implement a comprehensive statewide groundwater monitoring program that provides adequate and accessible information on both groundwater quality and quantity and involves all stakeholders in order to achieve a sustainable resource for future generations.

Visit the SWRCB GAMA website at www.swrcb.ca.gov/gama/. Contact Tim Parker at tparker@grac.org.

References.....

Belitz, K., N.M. Dubrovsky, K. Burow, B. Jurgens, and T. Johnson, 2003. *Framework for a groundwater quality monitoring and assessment program for California, U.S. Geological Survey Water-Resources Investigations Report 03-4166.*
Huston, S.S., N.L. Barber, J.F. Kenny, K.S. Linsey, D.S. Lumia, and M.A. Maupin, 2004. *Estimated use of water in the United States in 2000, USGS Circular 1268, pubs.usgs.gov/circ/2004/circ1268/*
Natural Resources Defense Council, 2001. *California’s Contaminated Groundwater: Is the State Minding the Store? www.waterboards.ca.gov/gama/docs/nrdcgw_4_01.pdf*
State Water Resources Control Board, 2003. *Report to the Governor and Legislature, A Comprehensive Groundwater Quality Monitoring Program for California. www.swrcb.ca.gov/gama/docs/final_ab_599_rpt_to_legis_7_31_03.pdf*