Groundwater Models under the Sustainable Groundwater Management Act

Tools to support Sustainable Groundwater Management

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Workshop Goals

1. To understand the current data collection, use and sharing practices in groundwater management decisions in California.

2. To understand how groundwater data and models can best be used to support Groundwater Sustainability Plan (GSP) development.

3. To identify challenges local agencies and the state may face in meeting the above goals.

4. To identify tools or other solutions to address these challenges.
Groundwater models

http://www.azwater.gov/AzDWR/Hydrology/Modeling/Model_Basics.htm
**Groundwater Model code**: the computer program that executes the governing equations representing the physical system.

**Groundwater Model**: a site-specific numerical groundwater model developed using a particular set of governing equations, parameters, and model conditions.
1. GSP to meet sustainability goal
   (Cal. Water Code §10727.2(b))

2. Forecast groundwater management actions
   (Cal. Water Code §10727.2(c))
**Sustainability Goal:** one or more groundwater sustainability plans that achieve *sustainable groundwater management*....to ensure that the applicable basin is operated within its sustainable yield.

**Sustainable Groundwater Management:** management and use of groundwater in manner than can be maintained during the *planning and implementation horizon* without causing *undesirable results*.

**Planning and Implementation Horizon:** a 50-year time period over which a Groundwater Sustainability Agency (GSA) determines that plans and measures will be implemented in a basin to ensure that the basin is operated within sustainable yield.
**Undesirable Results:** one or more of the following effects:

1. Chronic *lowering of groundwater levels*.....
2. Significant and unreasonable *reduction of groundwater storage*.
3. Significant and unreasonable *seawater intrusion*.
4. Significant and unreasonable *degraded water quality*...
5. Significant and unreasonable *land subsidence*...
6. Depletions of interconnected *surface water*....
SGMA Requirement 3

3. Coordinate data

(Cal. Water Code §10727.6)

GSAs implementing multiple GSPs across a basin shall coordinate with other agencies within the basin to utilize the same data and methodologies.

- Groundwater elevation data
- Groundwater extraction data
- Surface water supply
- Total water use
- Change in groundwater storage
- Water budget
- Sustainable yield
4. Involve stakeholders

(Cal. Water Code §10723.2)

The GSA shall consider the interests of all beneficial uses and users of groundwater, as well as those responsible for implementing groundwater sustainability plans.
The department may provide technical assistance to any groundwater sustainability agency in response to that agency’s request for assistance in the development and implementation of a groundwater sustainability plan.
SGMA Requirement 6

6. Evaluate GSPs

(Cal. Water Code §10733 and 10735.2)

1. To ensure GSPs will achieve sustainability goal

2. GSPs will not hinder the ability of an adjacent basin to meet their sustainability goals

3. Designate a basin as probationary if:
   1. A GSP is deemed inadequate
   2. It is a long-term condition of overdraft
   3. Groundwater extractions result in significant depletion of interconnected surface waters
Groundwater Data Survey

Developed by:

Stanford Law School | Martin Daniel Gould Center for Conflict Resolution Programs

WATER IN THE WEST

CALIFORNIA STATE UNIVERSITY SACRAMENTO

Feedback from:

Several local and county water management agencies
Groundwater Model use in California

**Goal:** To develop a more comprehensive understanding of the *current* state of groundwater data collection, use and sharing practices across the state.

**Target Audience:**
- GSA-eligible local agencies
- Groundwater managers
- Groundwater consultants
Survey Respondents by Hydrologic Region

Central Coast  Colorado River  North Coast  North Lahontan  Sacramento River  San Francisco Bay  San Joaquin River  South Coast  South Lahontan  Tulare Lake

5  3  2  1  17  7  5  8  2  4

n = 54
Finding One: Groundwater models are commonly used as a groundwater management tool.

Nearly 85 percent of survey respondents use a groundwater model in their jurisdictional area.

- Long-term planning: 85%
- Land use planning: 85%
- Extraction planning: 85%
- Recharge planning: 85%
- Subsidence planning: 85%
- Environmental impact: 85%
- Contaminant tracing: 85%
- Water budget: 85%
- Streamflow depletion: 85%

Other: 15%

n = 118
Finding Two: Groundwater models in California are developed using two model codes predominantly:

- **MODFLOW** (63%)
- **IWFM** (30%)
- **GSFLOW** (3%)
- **Other** (3%)

_\text{n} = 30_
Finding Three: Groundwater management agencies coordinate model runs

In-basin Coordination

67% use the same model
50% coordinate model runs

Between Basin Coordination

63% use the same model
56% coordinate model runs
Finding Four: Inadequate resources are a barrier for groundwater model development

![Graph showing barriers to groundwater model development]

- Other
- Inadequate data
- No need
- Too expensive

$n = 10$
Finding Five: More data aren’t necessary, but they would be helpful

65 percent of survey respondents indicated that additional data were acquired for model calibration

- Model Coordination, (33%)
- Basin Characterization, (30%)
- GW Pumping Data, (11%)
- Model Reporting, (15%)
- Other, (7%)
- Model Certainty, (4%)

n = 27
Summary

- Many agencies use groundwater models for planning purposes
- The majority of groundwater models are built on one of two model codes
- There is a lot of existing data
- There are a lot of existing relationships
Thank you