

# Caution!

Increase Water Supply



Increased Growth



No Reserve



Increased Vulnerability in a Drought

**Confronting Drought:**  
Establishing strategic groundwater reserves to reduce vulnerability to drought

Ruth Langridge, Andrew Fisher  
University of California, Santa Cruz

*"And it never failed that during the dry years the people forgot about the rich years, and during the wet years they lost all memory of the dry years. It was always that way."*  
John Steinbeck, East of Eden

Examining water supply planning through the lens of a drought



## The Problem

Establish reliable water supplies to address:

- 1) Increased demand
- 2) Drought exacerbated by climate change

Water Supply Planning to accommodate Demand AND Drought



## Groundwater Management

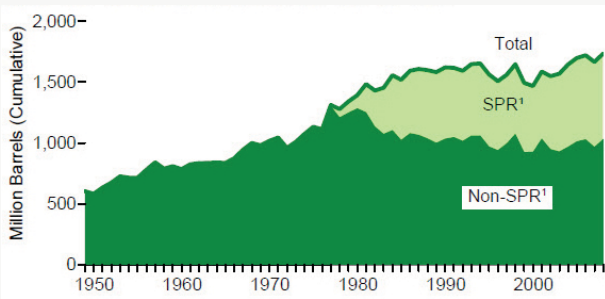
Recharge  
Storage  
Reserve



## Water Supply Planning in California

- | Drought  | Increased Demand  |
|--|---|
| <ul style="list-style-type: none"><li>• Response oriented</li><li>• Generate data</li><li>• Water shortage contingency plans</li></ul> | <ul style="list-style-type: none"><li>• Recycled water</li><li>• Water use efficiency</li><li>• Desalination</li><li>• New storage and conveyance</li><li>• Conjunctive use</li></ul> |

## Strategic Petroleum Reserve



In 1977, the United States began filling the Strategic Petroleum Reserve (SPR), a national reserve of petroleum stocks in case of emergency. At the end of 2008, the SPR held 702 million barrels of crude oil, 40 percent of all U.S. petroleum stocks.

## Our Premises:

- 1) Groundwater aquifers can act as important buffers during periods of prolonged drought
- 2) Groundwater management must not only meet seasonal and annual water requirements, but must also maintain a sufficient reserve capacity to be tapped during severe dry periods
- 3) Maintaining groundwater reserves will enable many areas to better adapt to climate change

## Project Objectives:

### Clarify:

- Definitions and measures of safe yield, overdraft and optimal groundwater levels
- Existing legal and institutional requirements to use, store and extract water

### Meta-analysis of:

- Physical dynamics of aquifers

### Determine:

- Metrics and targets for reserve

## Our Approach:

- Investigate physical and institutional opportunities and constraints to developing and sustaining a groundwater reserve
- Develop composite targets, mechanisms and incentives to support management practices that emphasize groundwater recharge AND the establishment and safeguarding of a reserve

## Local Authority to Establish Reserve

Agencies and Districts  
City and County Ordinances  
Adjudication

## Strategic Groundwater Reserve

“Deposit” water “utilizing appropriate recharge processes

Develop options, metrics and targets to establish a strategic reserve

Withdraw reserve only during a prolonged drought.



## What is “reasonable” use?

Water use must be reasonable for both water rights holders and public uses of the resource.

*Joslin v. Marin Municipal Water District (1967)*

The definition of reasonable use is dynamic

*Environmental Defense Fund v. East Bay Mun. Utility Dist., (1980)*

## State Authority to Establish Reserve

CA Constitution - Article X, Section 2

California Water Code

Public Trust Doctrine

The state has the authority to prevent impaired use or irreparable damage to groundwater basins caused by overdraft, sea water intrusion, degraded water quality and depletion

California Water Code §12922

## California Constitution Article X, Section 2

*“the waste or unreasonable use or unreasonable method of use of water be prevented and that the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interests of the people and for the public welfare.”*

“... the State shall determine what water of the State, surface and underground, can be ..... controlled for public protection.”

California Water Code § 104

## Reasonable and Beneficial Use

Applies to all surface and groundwater in the state

*Peabody v. City of Vallejo (1935) 2 Cal.2d*  
*Joslin v. Marin Municipal Water District (1967) 67 Cal. Cal. 2d*

## Sonoma County Water Agency

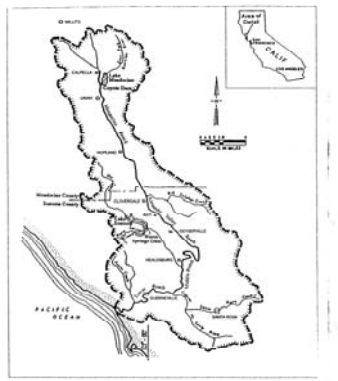


Figure 1.2-1: Map of the Russian River Basin (adapted from Florheims and Goodwin 19)

DWR shall take actions:

“to prevent waste, unreasonable use, unreasonable method of use, or unreasonable method of diversion of water in this state.”

California Water Code § 275

California can no longer ignore the consequences of a potential severe drought, and solutions must move beyond the general notion ..... of reducing water use when a drought occurs.

– Editorial: Slowly, Sacramento Bee 6/3/08

## Santa Cruz and Soquel Creek



## Challenges

Physical dynamics of groundwater systems are complex  
Groundwater monitoring is inadequate  
The California Legislature and many stakeholders are reluctant to increase regulation of groundwater

## Options

State and local discussions to define safe yield, overdraft and sustainable use that includes developing reserves  
Incentives for monitoring and data collection  
Increase carrot and stick incentives to prohibit overdraft, pollution and to sustain reserves

## Pajaro Valley Water Management Agency

