Water Stress and a Changing San Joaquin Valley

March 7, 2017

The San Joaquin Valley Futures project is supported with funding from the S. D. Bechtel, Jr. Foundation, the TomKat Foundation, and the US Environmental Protection Agency
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The San Joaquin Valley is at a pivotal moment

- California’s largest farming region faces unprecedented challenges and inevitable change
- Much at stake for region’s economy, public health, environment
- Most promising approaches
  - Increase flexibility
  - Provide incentives
  - Leverage multiple benefits
- Increased cooperation, coordination will be key
- State, federal governments can provide vital assistance
Outline

- Agriculture and the valley’s economy
- The valley’s long-term water imbalance
- Strategies, tools, and cooperative approaches
Valley agriculture is a local economic driver
The valley is California’s main dairy region
Agriculture adapts to changes in markets, technology, and water availability
Changes have spurred real revenue growth
Outline

- Agriculture and the valley’s economy
- The valley’s long-term water imbalance
- Strategies, tools, and cooperative approaches
The valley faces a long-term water imbalance, with reliance on groundwater overdraft.

**Annual averages 1986-2015**

**Net Water Sources**
- **56%** Local supplies
- **6%** Direct Delta use
- **25%** Delta imports
- **13%** Groundwater overdraft

**Net Water Uses**
- **89%** Farms
- **4%** Cities
- **2%** Wetlands
- **5%** Natural landscapes

Net Water Sources: 13.3 MAF
Net Water Uses: 13.3 MAF

Annual averages 1986-2015
Drought and declining imports have accelerated groundwater overdraft

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Millions of acre-feet

- Refill
- Drawdown

Dry years
Net groundwater withdrawal
Net groundwater recharge
State groundwater law requires balancing supply and demand

- Most of the valley’s groundwater basins are critically overdrafted
- Consequences are dry wells, sinking lands, reduced supplies for droughts
- Most basins must adopt plans by 2020, achieve sustainability by 2040
- Attaining balance means more recharge, less water use, or both
- Impacts will vary across the region
Valley agriculture faces related water, air, and habitat quality challenges

- Nitrate in groundwater
  - Risks to drinking water
- Salinity in west-side soils and groundwater
  - Limits crop productivity
- Poor air quality
  - Could increase with more land fallowing under SGMA
  - Dairy industry will need to tackle methane emissions
- Highly altered natural environment
  - Conflicts over land, water management
Outline

- Agriculture and the valley’s economy
- The valley’s long-term water imbalance
- Strategies, tools, and cooperative approaches
Many approaches to balance water supplies and demands

- **Manage groundwater reserves**
  - Water accounting
  - Incentive programs

- **Expand usable supplies**
  - Capture more local runoff
  - Repurpose local supplies
  - Improve Delta conveyance
  - Reduce coastal water demands
  - Change environmental flow standards

- **Reduce water demand**
  - Water trading
  - Flexible crops (e.g., alfalfa)
  - Rotational or permanent idling
Solutions for nitrate in groundwater

Safe drinking water programs

- Small systems (population less than 3,300) with contaminated wells and MCL violations

- Hydrologic regions

Farm programs to reduce nitrogen loading

Nitrogen loading to groundwater (kilogram per hectare per year)

- 0 - 5
- 5 - 10
- 10 - 35
- 35 - 50
- 50 - 75
- 75 - 100
- 100 - 150
- 150 - 200
- > 200
Range of approaches for salinity, dust management

- **Salts**
  - Major infrastructure (desalinate, “brine line”)
  - Crop choices, irrigation management

- **Dust from idled fields**
  - Cover crops
  - Solar
  - Habitat
New approaches can reinvigorate the natural environment

- Creative, realistic, “novel ecosystem” vision and goals
- Flexible habitat programs on working lands
- Voluntary settlement approaches for environmental flows

Rivers

Wetlands

Drylands
Manage recharge for water quality and quantity

- Tailoring irrigation systems, crop choices can
  - Maximize clean recharge in prime areas
  - Reduce chemical runoff elsewhere
Coordinate land idling with habitat needs

- Habitat connectivity on suitable lands
- Temporary habitat on rotationally fallowed lands
- Requires incentives, regulatory flexibility
Complex mix of local institutions manage water and land

- 70 local governments (62 cities, 8 counties)
- >150 irrigation water suppliers
- 671 drinking water suppliers:
  - 567 with <3,300 people
  - 400 with <300 people
- ~300(?) state small water systems
- ~1,300 non-community water systems (schools, etc.)
- ~70,000(?) domestic wells
- ~20,000 irrigated farms
- 215 resource-related districts
  - 65 land reclamation/levees
  - 25 flood control
  - 97 drainage
  - 27 resource conservation
  - 1 air pollution
- 17 IRWMs
- 15 SGMA sub-basins w/ 76 GSAs so far
- 12 irrigated lands coalitions
- 24 habitat conservation plans
- 3 safe-harbor agreements
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Effective and equitable solutions will require cooperative approaches

- Problems can’t be solved farm-by-farm
- Many opportunities to tackle multiple problems at once
- Urban-rural partnerships will be key
- State, federal agencies can play vital roles
Thank you!
These slides were created to accompany a presentation. They do not include full documentation of sources, data samples, methods, and interpretations. To avoid misinterpretations, please contact:

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For more information, see www.ppic.org/water

Thank you for your interest in this work.