How water management agreements are likely to impact agriculture in California and beyond

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The Western US is facing an unprecedented water crisis

- Competing demands are increasing water conflicts
  - Population growth increases water needs for cities and food production
  - Degraded ecosystems also need more water

- Climate change intensifies droughts and floods

As a major water user, agriculture is highly vulnerable

Source: Escriva-Bou et al. (2016). Accounting for California's Water
Groundwater is being depleted like never before

Although there are important challenges, agriculture will still thrive in the Western US

- Embrace the challenges
  - A reduction in water availability will translate in a reduction in farmland

- Define successful transition pathways
  - Water trading
  - Water partnerships
  - Land repurposing
The San Joaquin Valley is at a pivotal moment

- > 50% of California’s agricultural output
  - Fresno, Kern and Tulare Counties are the nation’s top three agricultural counties

- The valley is ground zero for implementing the Sustainable Groundwater Management Act (SGMA)
  - All basins must achieve sustainability by 2040

Priority basins for sustainability plans
- Critically overdrafted
- High priority
- Medium priority
- Low priority

Source: Hanak et al. (2017). Water stress and a changing San Joaquin Valley
Agriculture is a key driver of the San Joaquin Valley’s economy

Source: Escriva-Bou et al. (2023). The Future of Agriculture in the San Joaquin Valley
Water challenges loom over California’s San Joaquin Valley

- By 2040, average annual water supplies could decline by 20% (3.2 maf)

**Source:** Escriva-Bou et al. (2023). The Future of Agriculture in the San Joaquin Valley
Water challenges loom over California’s San Joaquin Valley

- By 2040, average annual water supplies could decline by 20% (3.2 maf)
- Without adaptations:
  - ~900,000 acres of lands fallowed, ~50,000 jobs lost, and a 2.3% decline in GDP

Source: Escriva-Bou et al. (2023). The Future of Agriculture in the San Joaquin Valley
The water problem in the Colorado basin is similar

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- It provides water to 7 states and Mexico
- Allocations are based on outdated hydrological assumptions
- Current allocations exceed supplies in 2-3 maf/year
  - ~13-20% of total supplies

Source: Schmidt et al. (2023). The Colorado River water crisis: Its origin and the future
Water trading and supply strategies can soften the impacts of water stress

- Water trading would significantly reduce economic losses

**Reductions in applied water** (Thousands of acre-feet)

**Land falling** (Thousands of acres)

**Agricultural GDP losses** (Billions of $)

**Agricultural job losses** (Thousands)

Source: Escriva-Bou et al. (2023). The Future of Agriculture in the San Joaquin Valley
Water trading and supply strategies can soften the impacts of water stress

- Water trading would significantly reduce economic losses
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Water trading and supply strategies can soften the impacts of water stress

- Water trading would significantly reduce economic losses
- New supplies would reduce falling and mitigate losses
- Productivity growth could raise farm output above today’s levels

Source: Escriva-Bou et al. (2023). The Future of Agriculture in the San Joaquin Valley
Water partnerships and expansion of supply infrastructure options

- Partnerships can increase resilience for farms and cities:
  - Increase overall supplies for farms to address supply constraints
  - Build urban resilience during droughts
- Connecting infrastructure and water sharing agreements are key to promote these options

The State Water Project connects the San Joaquin Valley and Southern California. Photo: DWR
Regional water demands and demand projections have been falling in Southern California

Source: Escriva-Bou et al. (2020). Water Partnerships between Cities and Farms in Southern California and the San Joaquin Valley
There is a window of opportunity for partnerships between Southern California and San Joaquin Valley

- **Two major shifts:**
  - Agriculture: SGMA heightens interest in expanding supplies, underground storage
  - Urban areas: Demand reductions reduce supply pressures during normal/wet years. Droughts now major concern

- State Water Project infrastructure facilitates partnerships

*Source: Escriva-Bou et al. (2020). Water Partnerships between Cities and Farms in Southern California and the San Joaquin Valley*
Existing partnerships use the water grid to manage droughts, scarcity, infrastructure costs

- Underground storage in southern SJ Valley
- Long-term transfers of dry-year water from Yuba River
- Various Colorado River trading and storage partnerships
- Interstate partnerships
What types of partnerships are possible?

- **Co-investments**
  - Farmers invest in alternative water supplies, conservation in cities
  - Urban agencies expand investments in water storage, conveyance in ag regions

- **Unbalanced exchanges**
  - Farmers get a more water in normal/wet years in return for supplying some water during droughts

- **Mixed strategies**
  - Co-investments + unbalanced exchanges

- **Opportunities related to future urban growth**
  - Cities invests in long-term supplies, with near-term transfers to ag
Managing water and land transitions

- There are some options for keeping lands productive with less water
- Providing economic alternative to farmers can align water and land policies
- Reduce negative impacts of fallow lands
Keeping land productive will require innovation and investment

- Solar is promising (135–215K acres in the valley), but transmission is a bottleneck

Source: Ayres et al. (2023). Managing Water and Farmland Transitions in the San Joaquin Valley
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- Recharge basins can be managed for multiple benefits
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- New developments could bring revenues and save water

Source: Ayres et al. (2023). Managing Water and Farmland Transitions in the San Joaquin Valley
Embracing the challenges and planning for successful transitions pathways is key for the future of ag

- Assess the water constraints and define realistic plans
- Innovate with new approaches:
  - Water trading
  - Water partnerships
  - Land repurposing
Effective and equitable solutions will require cooperative approaches

- **Planning**
  - Strengthen coordination across basins and sectors

- **Flexible regulatory approaches**
  - Promote effective and responsible water trading

- **Make strategic water, land and energy infrastructure investments**

- **Provide local, state, federal financial incentives**
  - Align regulatory and fiscal incentives
Thank you!

Don’t hesitate to send me an email if you have any questions, comments or suggestions.

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