

Increasing Water Supply Reliability and Watershed Resilience through Portfolios, Prices, and Partnerships

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Presented at:

The Santa Ana River Watershed Conference

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The Tao of Pooh: The Path Towards Increasing Watershed Resilience through the three Pee's P's

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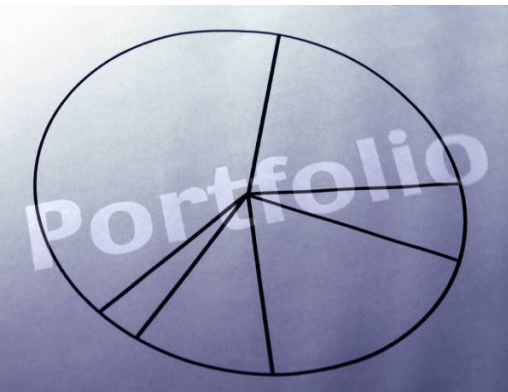
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Objectives / Outline

- Discuss the economics of three strategies to increase watershed resilience
 - Portfolios
 - Price-based incentives
 - Partnerships
- Identify some issues that may need further attention as we move forward



A. Diversified Portfolios can increase water supply reliability & reduce costs / exposure to extreme events

Commonly understood in the financial economics literature

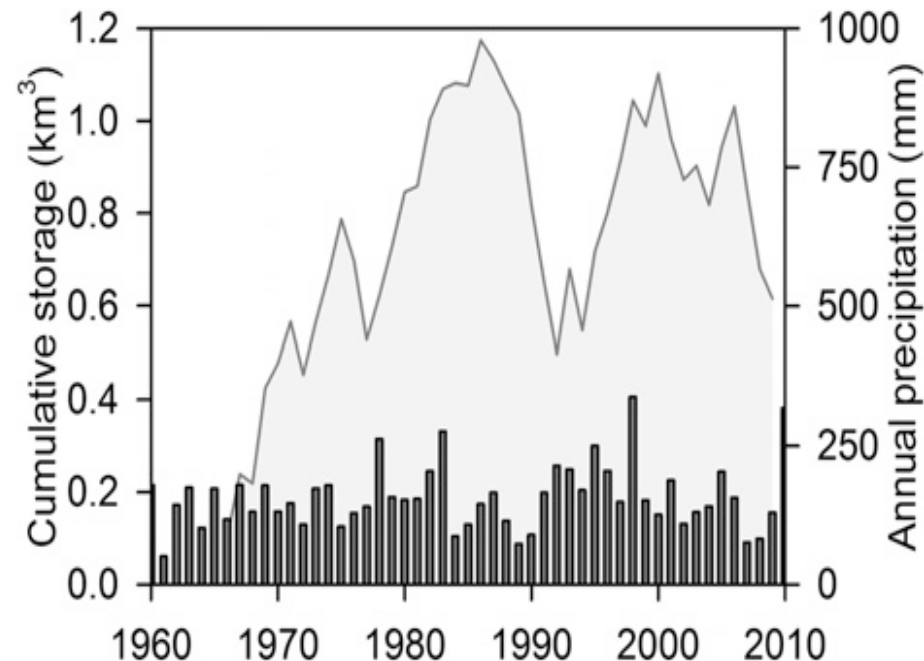
- “Don’t put all your eggs in one basket”
- 1990 Nobel Price in Economics: Harry Markowitz (1952) on efficient investment

Portfolio diversification can occur via economic activity...(e.g., California 1967-2010)

- Ag share of state GDP: 5% => 2% (Hanak et al. 2012)
 - Water use per capita decreased by 50%
 - GDP/capita increased by 100%
 - GDP/unit of water increased by 300%

...or via water supply/mgmt (e.g., MWD)

- Imported Water
- Surface Water
- Groundwater (conjunctive/replenishment)
- Recycled Water
- Stormwater Capture
- Water Markets / Water Banks



Arvin-Edison Groundwater Bank (Scanlon et al., 2012)

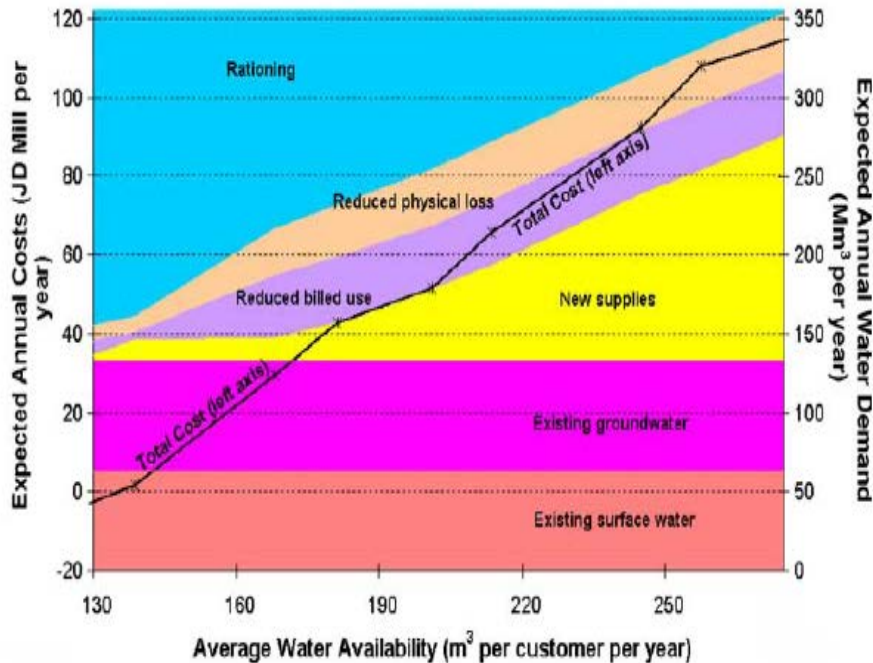
A. Diversified Portfolios can increase water supply reliability & reduce costs / exposure to extreme events

(a) Diversified Portfolios in agricultural sector

- California agricultural land values can increase from between 12 to 100% as the water portfolio expands (Mukherjee and Schwabe 2014)

(b) Diversified Portfolios in urban sectors

Amman Jordan (Rosenberg & Lund 2009)



MWD (Kidson et al. 2013)

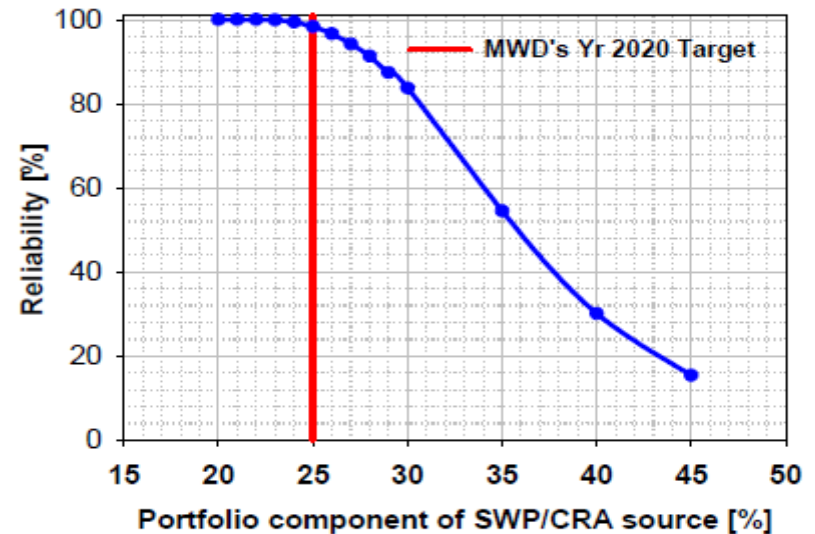
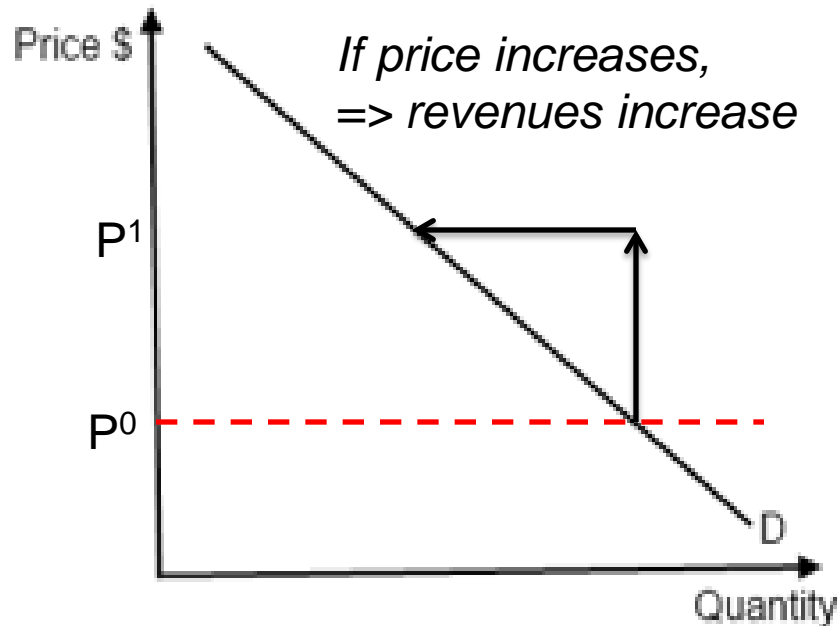


Fig. 1: Reliability of MWD's Yr 2020 supply with increasing portfolio exposure to SWP/CRA surface water sources.

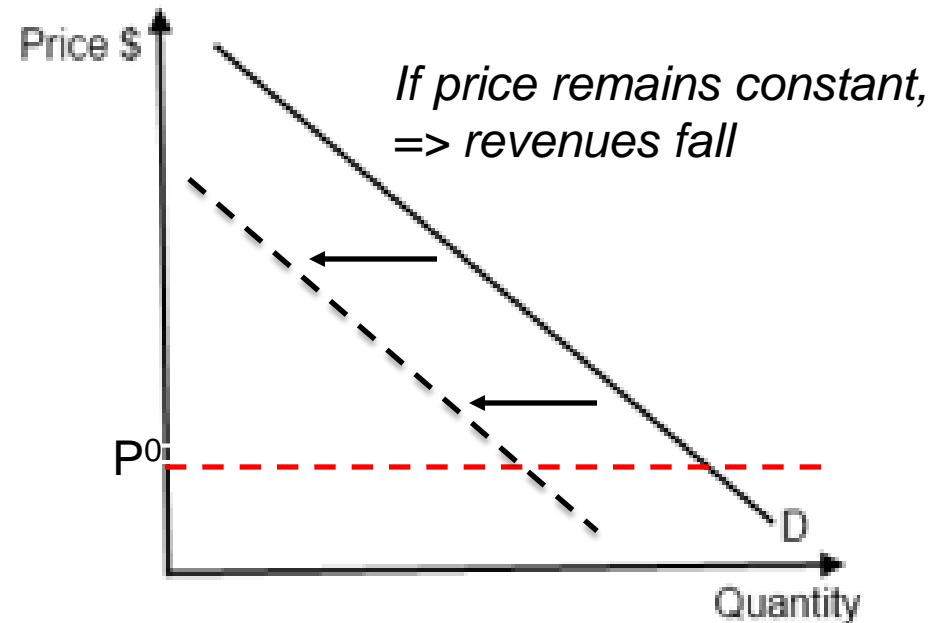
B. Price-based incentives to reduce residential water use

- Increase water price per unit



- Rebates to adopt water conserving technologies

- Low-flush toilets
- Low-flow shower heads
- High-efficiency sprinkler nozzles
- Turf grass replacement



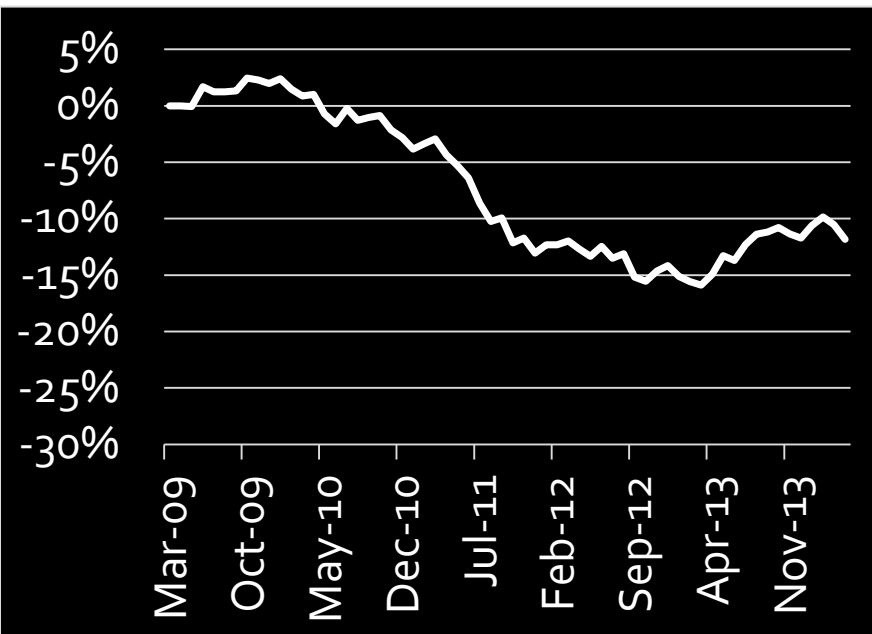
B. Effectiveness of Alternative Price-based Approaches???

MWD Service Area: 208 gpcd (1990) vs. 175 gpcd (2013)

Question: How to further reduce residential water use (per capita)???

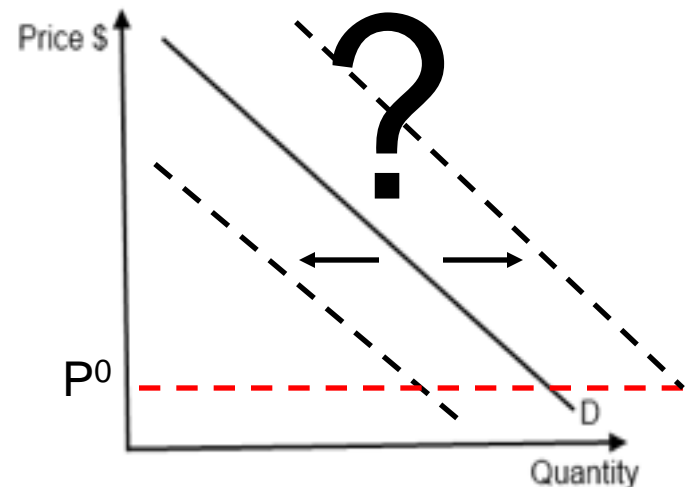
Answer: Research says...

- Prices can be effective



*EMWD Budget-Based Rates
(Baerenklau, Schwabe, Dinar 2014)*

- Rebate programs can lead to many unanticipated outcomes
 - Not adopt or use differently?



=> Benefit from systematic program evaluations

C. Partnerships to address regional watershed issues

Observation: Actions in one district / region may have unintended impacts on activities in another district / region

⇒ Externalities

Presence of *externalities* suggest gains from cooperation / trade

Santa Ana Watershed

- “Downstream” water districts are influenced by “upstream” water districts
- All water districts are influenced—directly or indirectly—by upper watershed activities

Question: Are we taking full advantage of these partnerships?

C. Partnerships to address regional watershed issues

Watershed protection saves cities billions of dollars per year in avoided treatment costs nationwide (Postel and Thompson 2005)

Table 3. Selected US cities that have avoided construction of filtration plants through watershed protection

Metropolitan area	Population	Avoided costs through watershed protection
	(thousands)	
New York City ^a	9,000	\$1.5 billion spent on watershed protection over 10 years to avoid at least \$6 billion in capital costs and \$300 million in annual operating costs.
Boston, Massachusetts ^b	2,300	\$180 million (gross) avoided cost.
Seattle, Washington ^c	1,300	\$150–200 million (gross) avoided cost.
Portland, Oregon ^d	825	\$920,000 spent annually to protect watershed is avoiding a \$200 million capital cost.
Portland, Maine ^d	160	\$729,000 spent annually to protect watershed has avoided \$25 million in capital costs and \$725,000 in operating costs.
Syracuse, New York ^e	150	\$10 million watershed plan is avoiding \$45–60 million in capital costs.
Auburn, Maine ^f	23	\$570,000 spent to acquire watershed land is avoiding \$30 million capital cost and \$750,000 in annual operating costs.

Conclusions

Southern California has invested in significant diversity regarding water management

- *To what degree are investments being optimized to increase reliability using standard economic principles*

Southern California has invested in numerous water conservation programs since the 1990s with impressive results

- *Further significant and necessary reductions will likely require more systematic evaluation of which programs have worked and why*

Similar to any watershed, externalities exist within the Santa Ana Watershed

- *Are there opportunities for further partnerships that help increase watershed resilience and benefit individual water districts?*



Winston Churchill

There is only one thing worse than fighting with allies and that is fighting without them