Adaptive Regional Resilience Through Negotiated Risk-Sharing Agreements

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Water supply variance and regional economies

- Water use sectors highly interdependent
- Water energy costs linked, big econ impacts
- Large % farm income is off-farm sources
- Bond ratings, ability to borrow
- Tourism, leisure spending by locals
- Property value impacts, insurance costs
“Optimizing” Water Supply Reliability
Around Regional Economic Vitality

water supply portfolios for differing risk-reliability needs & ability to pay

adaptation to minimize econ dislocation

short vs long term adaptation
Sharing Water Supply Reliability Risks

- Voluntary regional agreements across water using sectors and locations
- Activated by specified trigger conditions
- Motivated by differences in costs of shortage across sectors and locations and willingness-to-pay
Risk-sharing: high value perennial crops and low value fields crops

- Orchards and wheat, for instance
- Preserving high profit crops NOT same as preserving ag jobs
Risk-sharing: urban water provider and irrigation district

- Urban provider – avert costs of severe water rationing
- Habitat managing agency – avert species die off due to low flows, temp, quality
- Irrigation district – implement voluntary program to cease irrigating marginal fields
Triggers to Activate Water Sharing Agreements

- reservoir levels, snowpack conditions
- seasonal climate & water supply forecasts
- new CLIMAS RISA project – economic stakes linked to forecast skill
- “it’s a forecast, not a contract…”
Perils of Risk-Sharing Contingency Agreements

Type I Error - FALSE ALARM

- water sharing agreement implemented
- irrigated acreage cut back
- water not needed … late spring storms or cooler summer weather.
Type II Error

Risk-sharing agreement NOT implemented
Shortage occurs in most vulnerable areas
High costs and economic dislocation
Type I Errors - in unnecessary cessation of irrigation and water acquisition costs

Type II Errors - water shortage costs which could have been averted

Which is water manager’s “worst nightmare”? 
As if Type I and II Errors weren’t enough to worry about...
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Type III Error “solving the wrong problem… when one should have solved the right problem” Mitroff and Featheringham 1974
As if Type I and II Errors weren’t enough to worry about…

Type IV Error “solving the right problem too late” Harvard economist Raiffa, 1969
Adaptation Agreements - What Do We Need to Get Better At?

- Ag crop cycles, seasonality
- Urban areas: what’s it really worth to avoid water restrictions, electricity brownouts?
- Addressing peak resource usage - seasonal and time-of-day water and energy use
“smart fallowing”

- seasonal irrigation forbearance, rather than year-round (apologies to cold regions)
- significantly decreases costs of forbearance
- requires cost-effective monitoring to ensure fields not irrigated for dates agreed
- remote sensing monitoring protocols, “ground truthed”
three new stakeholder guidebooks

- [ag.arizona.edu/arec/people/profiles/colby.html](ag.arizona.edu/arec/people/profiles/colby.html)
- O’Donnell and Colby, University of Arizona, Agricultural and Resource Economics
- Water Banks: A Tool for Enhancing Water Supply Reliability, January 2010
- Dry-Year Water Supply Reliability Contracts: A Tool for Water Managers, October 2009
Resilience – for the long haul

Roman Aqueduct, Pont du Gard, France

Thank you!

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