El diálogo con tomadores de decisiones y actores sociales

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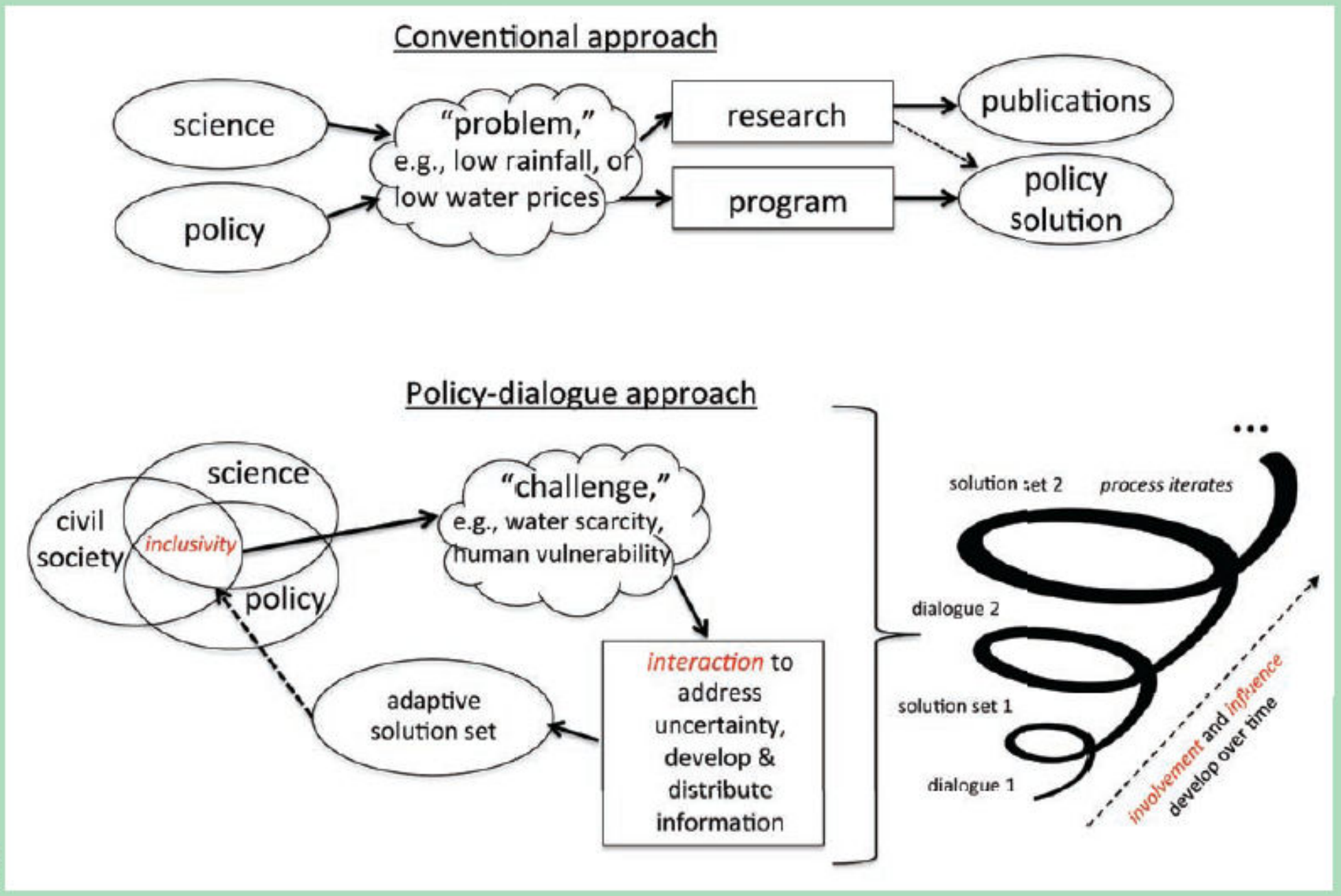
Science-Policy Dialogues for Water Security:

Addressing Vulnerability and Adaptation to Global Change in the Arid Americas

by Christopher A. Scott, Robert G. Varady, Francisco Meza, Elma Montaña, Graciela B. de Raga, Brian Luckman, and Christopher Martius

Figure 1: Conventional adaptive approaches tend to offer less robust solutions than sustained science-policy dialogues.



Authors

Four elements to evaluate science-policy dialogues and their effectiveness

- **Inclusivity**: degree to which key scientists, decision-makers, other stakeholders participate in the dialogue and represent an appropriate range of viewpoints… Team members who are multinational, multilingual, and broadly interdisciplinary

- **Involvement**: commitment and continuity of dialogue participants—particularly agency staff, civil society representatives, and, increasingly, the private sector.

- **Interaction**: the degree to which participants discuss, assimilate, exchange, create, and disseminate relevant information among each other and to those outside the process.

- **Influence**: the ability of the dialogue to effect institutional changes, such as policies, laws, inter-agency or intra-agency practices, and intergovernmental or international agreements

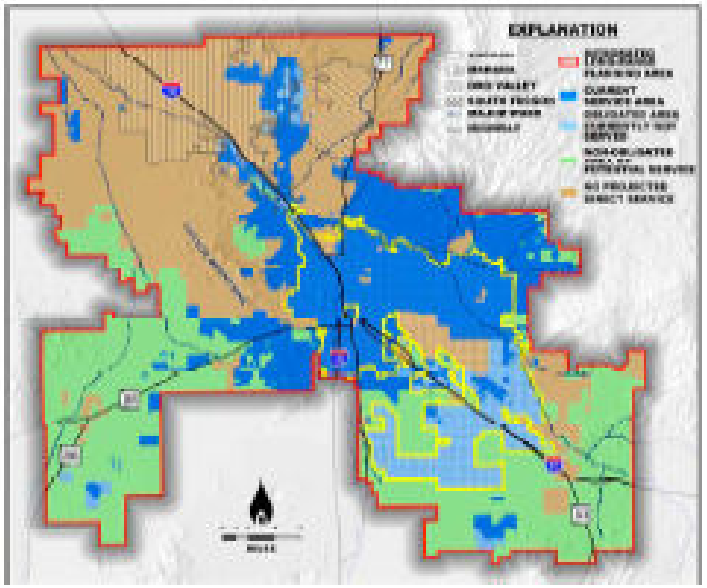
Scott et al, 2012

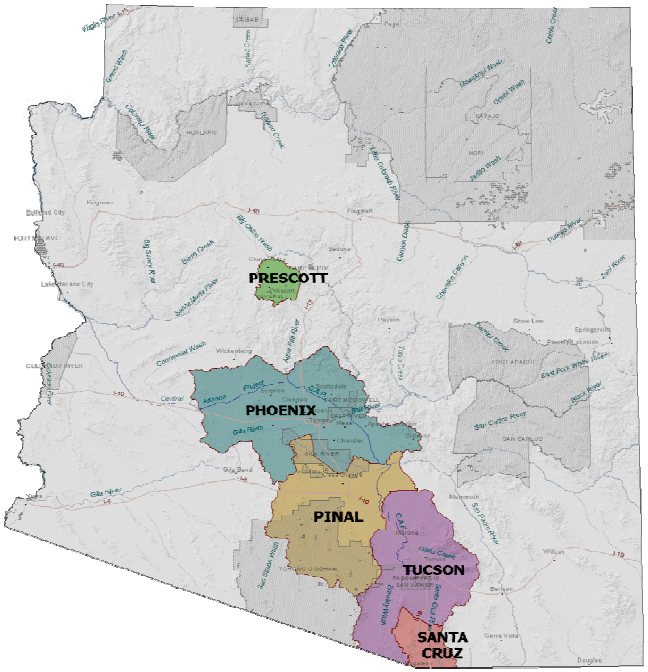
Estudio de caso: Tucson, Arizona

Christopher A. Scott, Anne Browning-Aiken, Oscar Lai, Delphine Clavreul

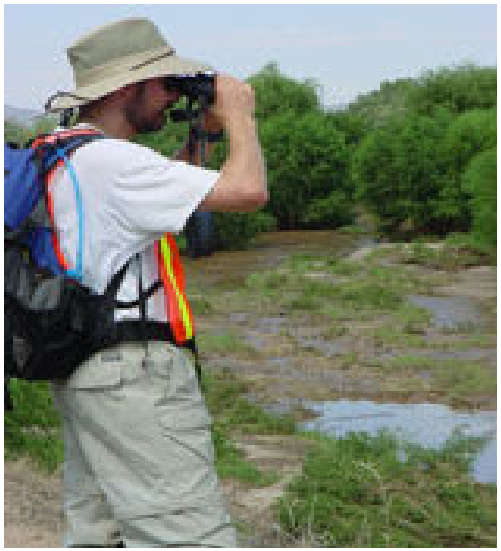
The Challenge

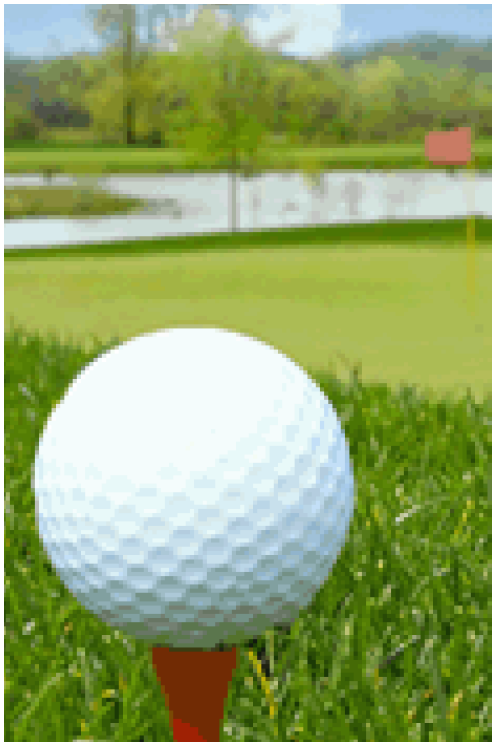
- City of Tucson Water Department and Tucson Active Management Area
- Water use trends and changing demand
- Vulnerability
  - Drought
  - Resource dependence
  - Effluent
  - Conservation
- Adaptive water management
- Implications for policy and planning



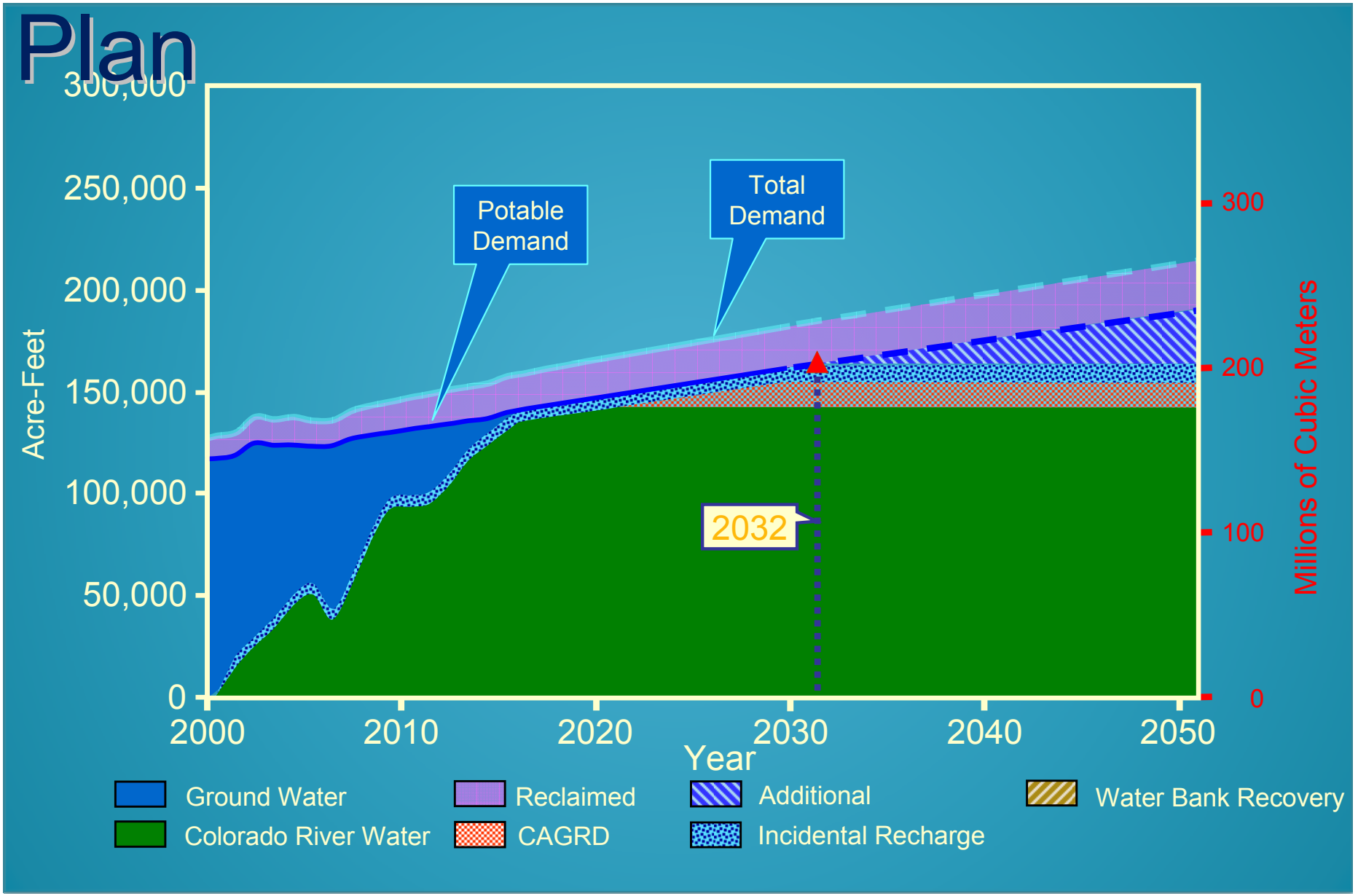


Water in Tucson





Tucson Water's Water-Resource Utilization Plan



Water-climate vulnerabilities

- Prolonged drought and climate change
- Resource dependency on narrow range of available water resources
- Differential impacts of lack of availability or access to water
- Perceptions of respective entitlements to the resource
- Capacity of an individuals and system managers to adapt and maintain livelihoods

Drought

- “Drought can extend for a single season or last for several years. Our current drought has lasted for about ten years and we have no indications of when this drought will end.”
- Summer monsoon:
  - June-September rainfall averages 6.06 inches (154 mm)
  - 1989 and 2004 - 40 percent of the long-term average
- Social and institutional factors influence Tucson’s capacity to respond to drought:
  - Water conservation practices
  - Long-term storage (aquifer recharge and recovery)

Managers' & planners' perspectives: Tucson's vulnerability to climate

- "Drought and climate change represent the vulnerability we never dealt with in the past."
- "We know about global warming and drought, yet we continue our dependence on groundwater."
- "We need to match climate uncertainty with sustainability principles that form the core of integrated water resources management."

Managers' perspectives: Water resources planning

- "We excessively use groundwater and face a potential reduction in our CAP allotment... We need to increase use of reclaimed water and to move customary uses of potable water to reclaimed water, especially more treated effluent to augment groundwater"
- "Take the initiative now to establish regional conservation practices, develop and deploy regional infrastructure, and develop alternate water resources . . . to meet the needs of today's—and tomorrow's—customers"

Managers' perspectives: Public perceptions

- "Most people don't understand either the **whole water cycle or the carrying capacity** of the region."
- "The **public** needs to appreciate the true value of reclamation & the amount of energy it requires."
- "It's crazy to call reclaimed water '**wastewater**'; it's definitely water that shouldn't be wasted."
- "**Growth** will occur regardless of the status of water or water reclamation. Having or not having reclaimed water will not promote growth, but will enable water managers to deal with it."
- "The public asks, 'Why conserve for future **growth**?'

Effluent as a hedge against water sector vulnerability

- 15,750 acre-feet (19.4 million m^3) of effluent mostly for golf courses, schools, public parks
- Small fraction available to residential users in 3 Tucson neighborhoods
- Effluent for habitat restoration in Santa Cruz River
- Water banking credit
- 9 percent of Tucson's water demand

Arizona Daily Star
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RON MEDVESCEK / ARIZONA DAILY STAR

Work is already underway on Meritage Homes' Los Saguaros community off Dove Mountain Boulevard on the northwest side. On Tuesday, workers from Royce Masonry were building retaining walls along the edge of one of 60 lots.

New AZ permit may stoke housing boom on NW side

State OKs more capacity for treatment plant that's shifting to Marana control

By Becky Pallack

340 planned residential and commercial buildings on hold for permits during the past two years.

The new state permit, which allows for significant expansion of the Marana plant and clears the way for new con-

access to wastewater service," he said.

Part of the overload was the result of permits issued for about 2,000 building projects the were subsequently put on hold by their developers due to the recession. Although the projects were

Golf course planned as college site

City is in talks to sell, lease El Rio to private Grand Canyon University

By Darren DaRonco
ARIZONA DAILY STAR

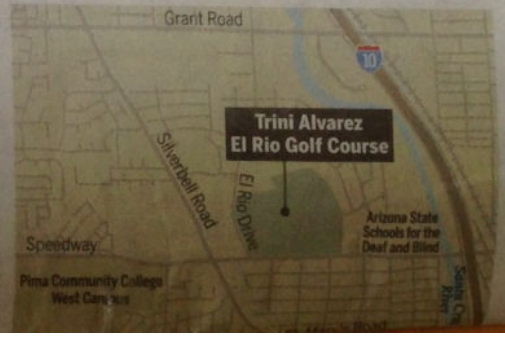
Tucson's El Rio Golf Course appears to be the leading contender to become the home of a new campus of Grand Canyon University.

City officials have been negotiating with the university to sell or lease the west-side course to the Phoenix-based private Christian university.

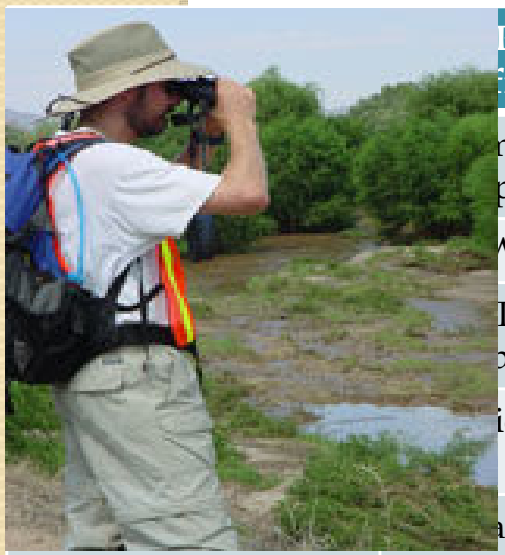
The city proposed the golf course once it was revealed Tucson was on the university's short list for expansion, said City Councilwoman **Regina Romero**. Grand Canyon officials could not be reached for comment.

"When they asked us what site, we offered them the El Rio golf course," Romero said. "I think it's a really great opportunity to bring in high-paying jobs and economic development."

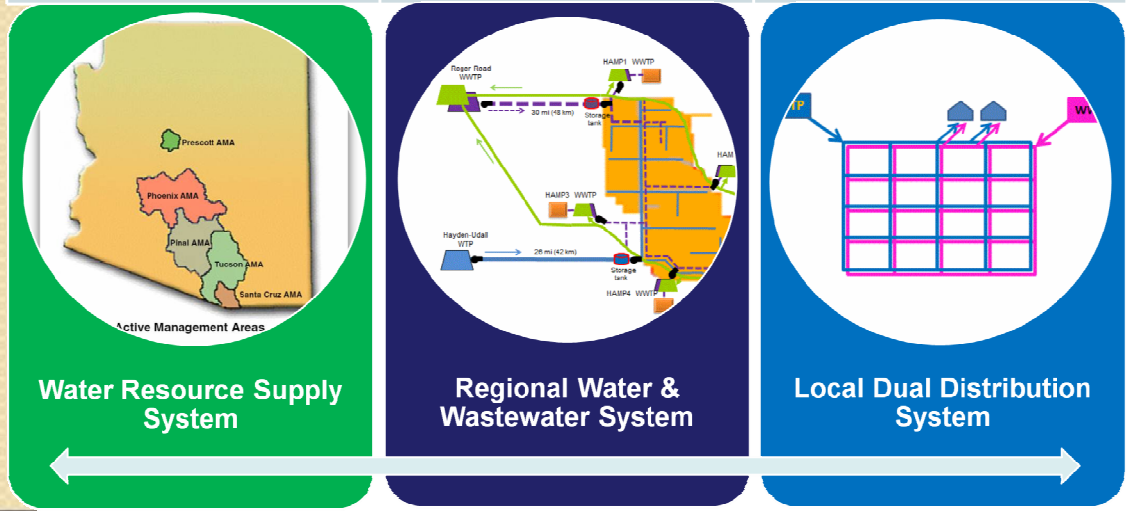
See COLLEGE, A4



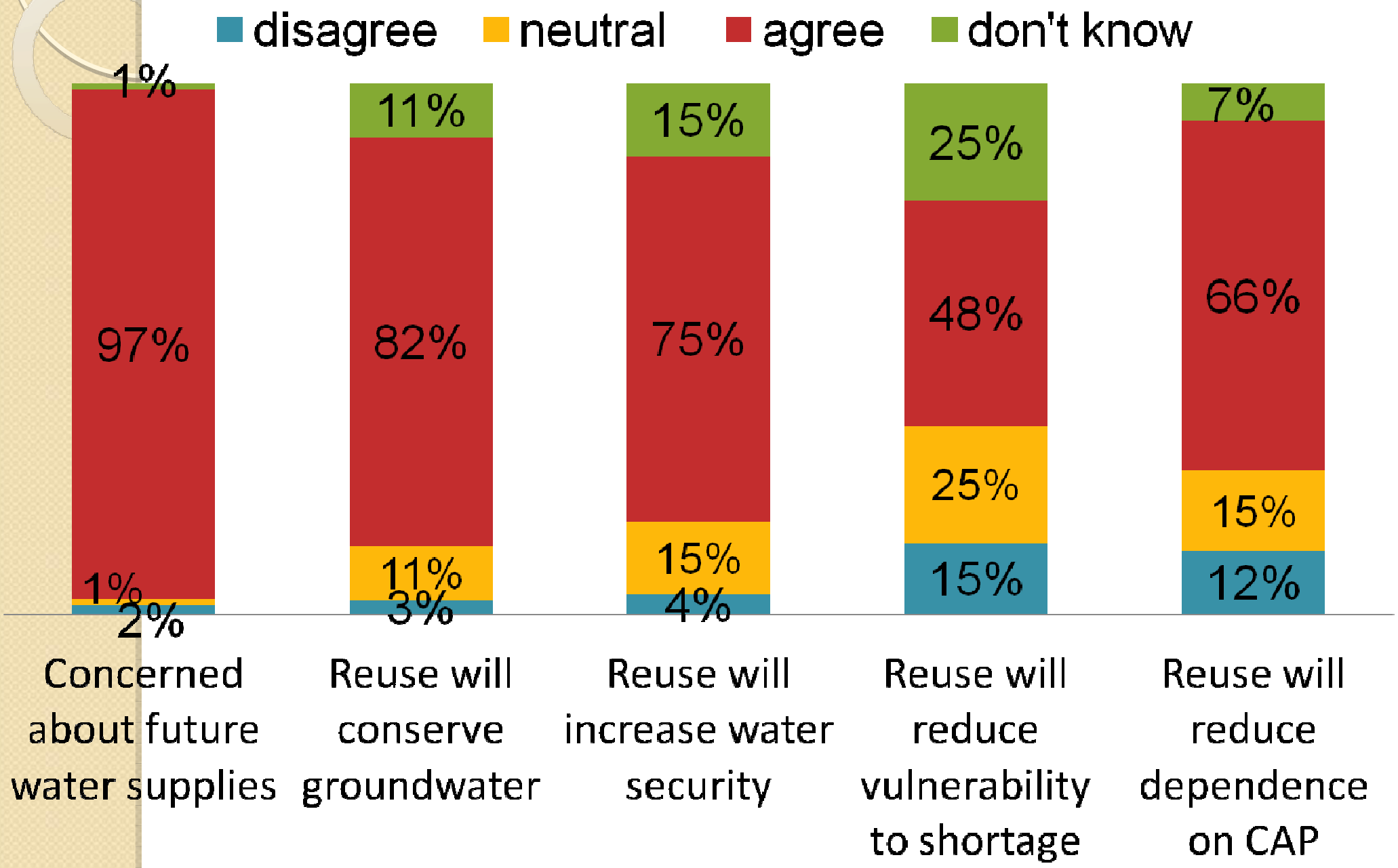
Arizona water reuse uncertainties



Regulations	Reg	
	Mechan	
	Conjunctive Operations	
	Energy Outages	



Water reuse & water security



Conservation & demand ‘hardening’

- If conservation takes all the ‘slack’ out of the system (and growth consumes the water saved), there’s little opportunity to adapt to future shortage

Water utility paradox

- Higher water sales pay for operation and maintenance, but utilities are charged with decreasing consumption

Adaptive water management

Adaptive management identifies uncertainties, and then establishes methodologies to test hypotheses concerning those uncertainties.

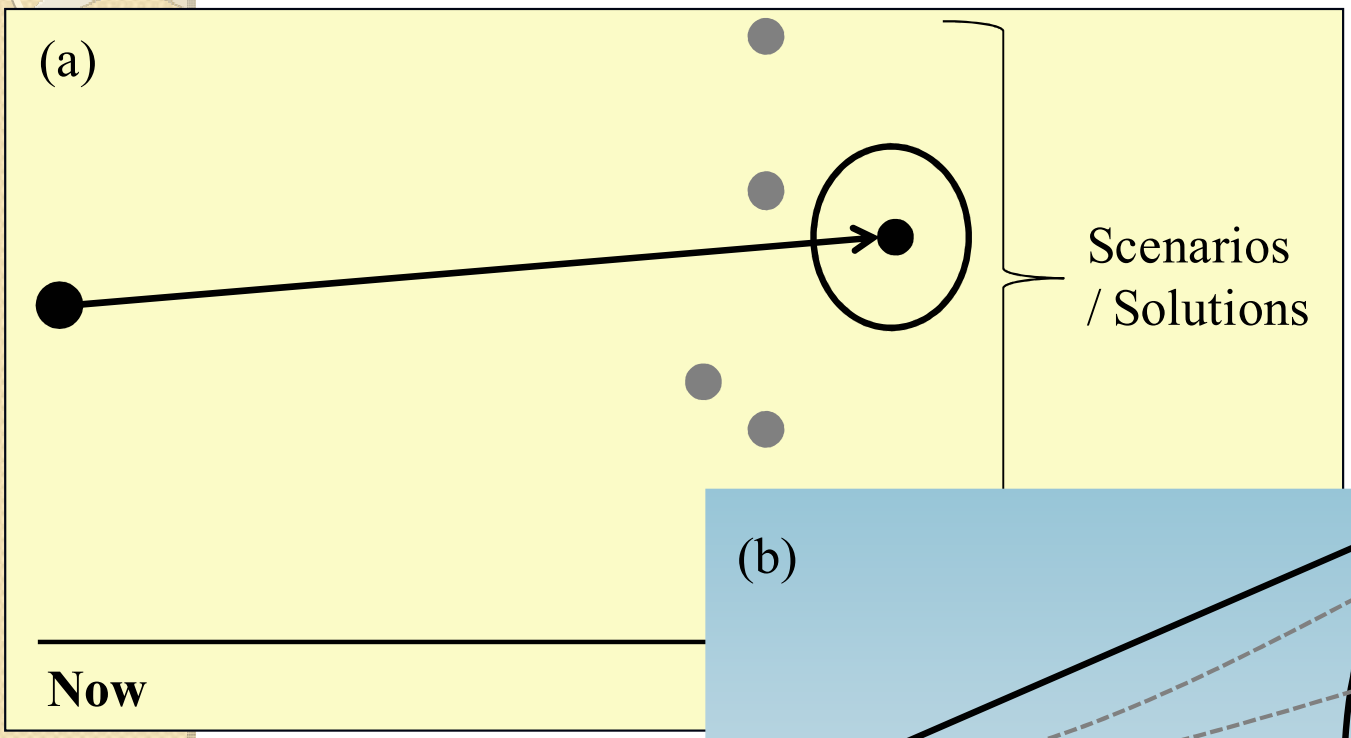
Adaptive management must be a social as well as scientific process and focus on the development of new institutions and institutional strategies

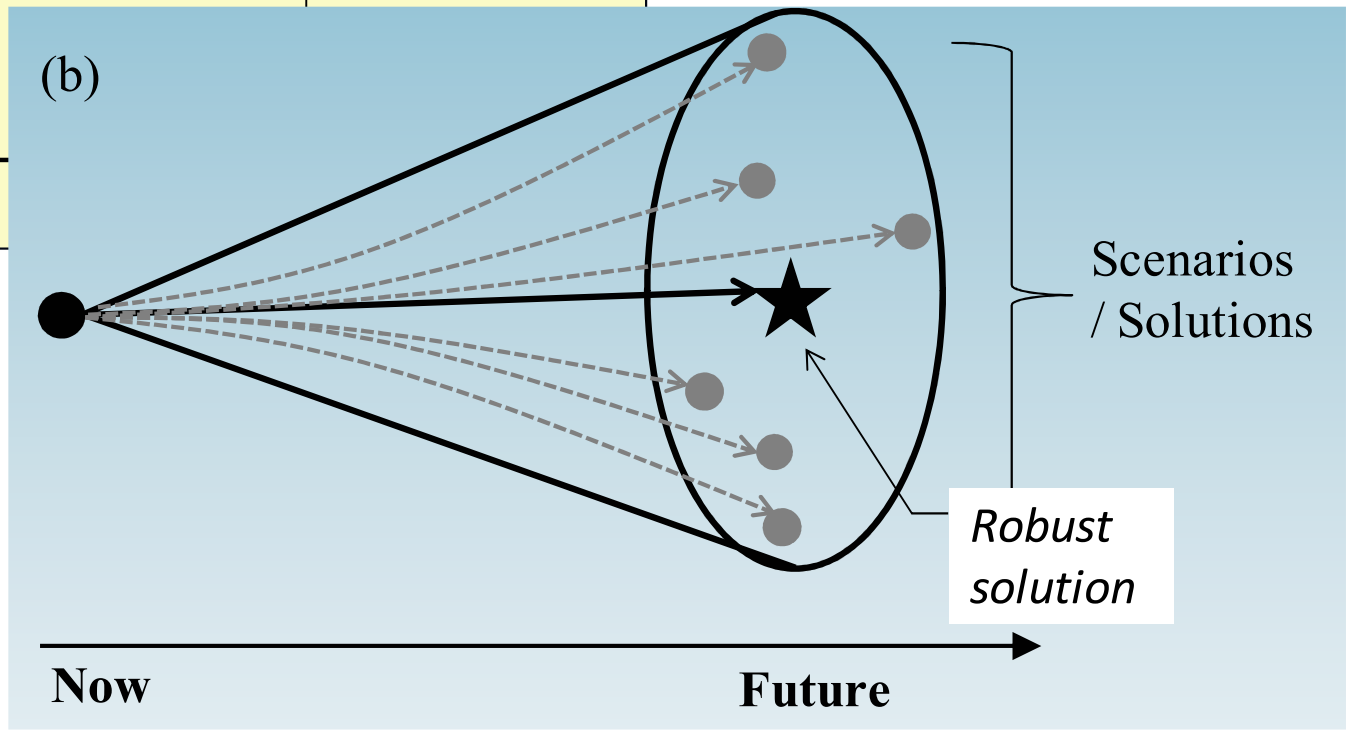
Examples: Scenario planning, City/County Water/Wastewater Study

Implications for policy and planning

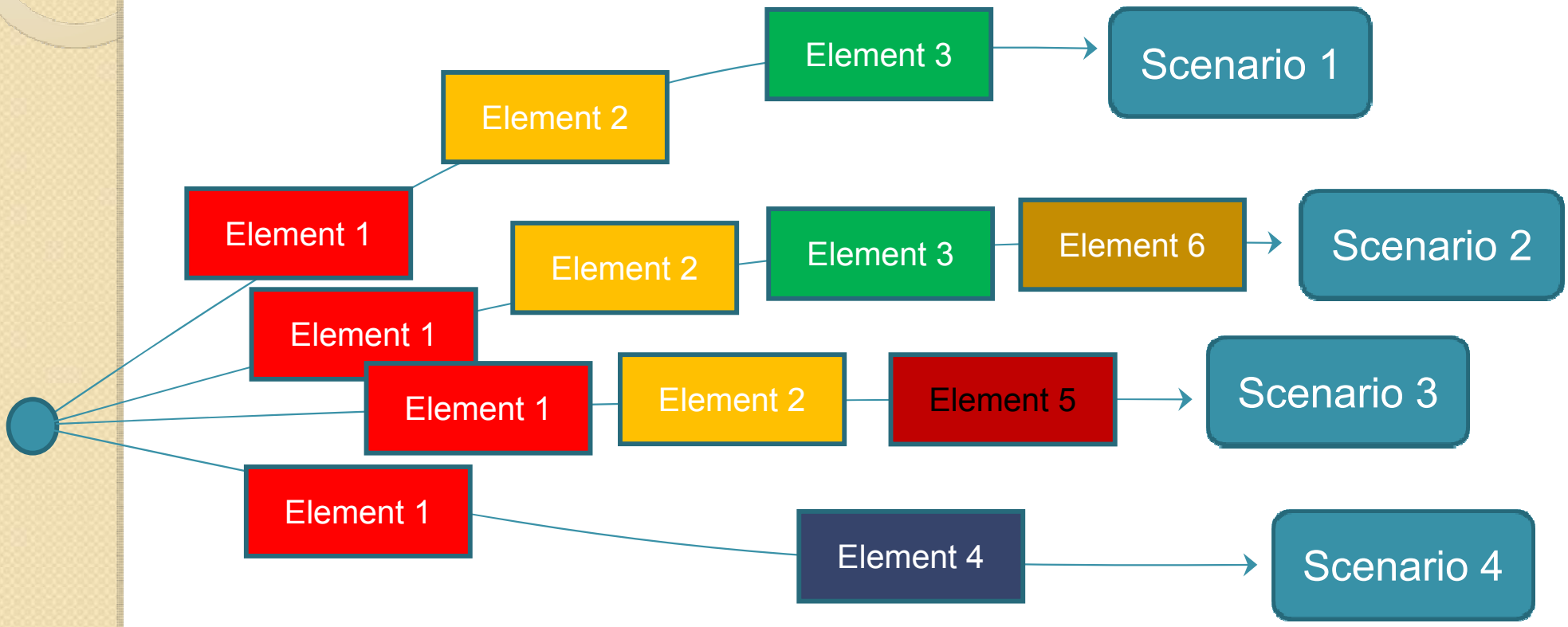
- Underscore State-level planning (“Blue Ribbon Panel”) efforts to increase water reclamation and recycling
- Promote regional planning across multiple jurisdictions
- Media campaign and televised townhall-like opportunities to discuss potential solutions
- Encourage conservation, reduced outdoor landscaping, incentives for rainwater harvesting and greywater (careful of wastewater flows)
- Substitute effluent for non-potable uses

Scenario Planning Approaches

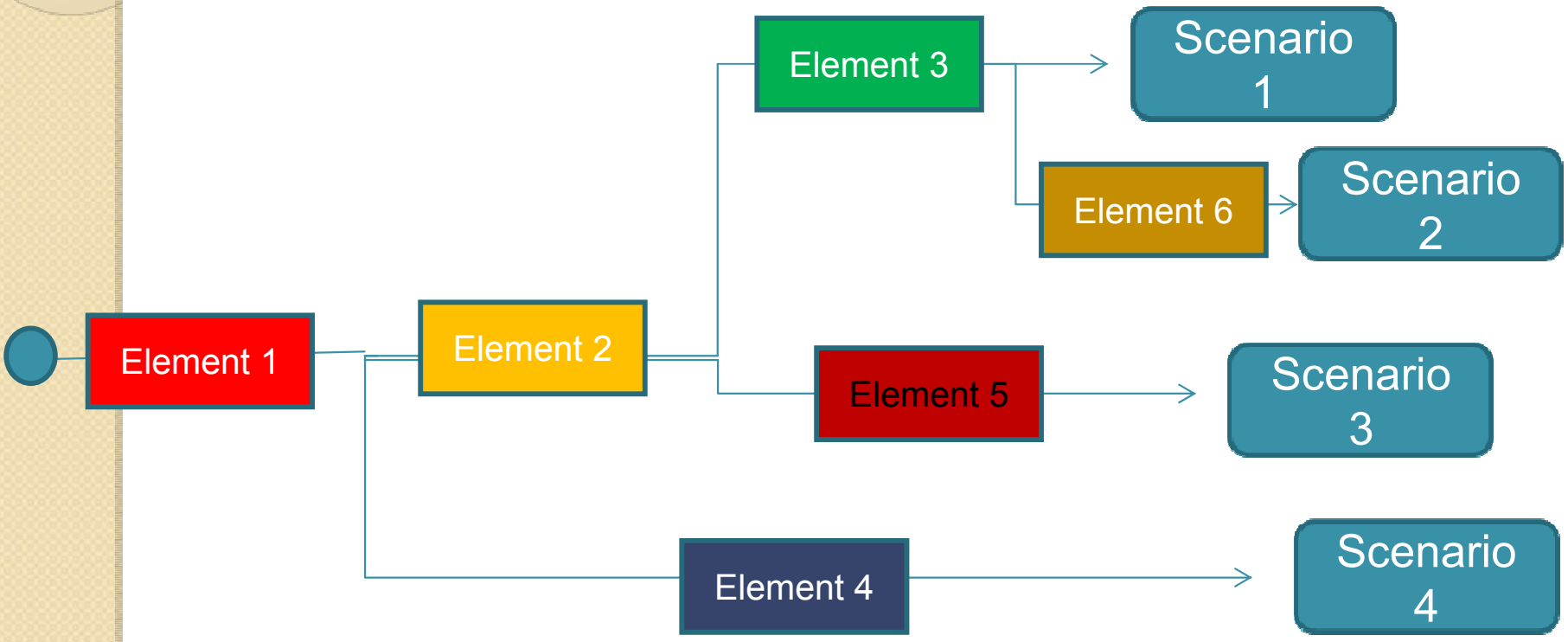




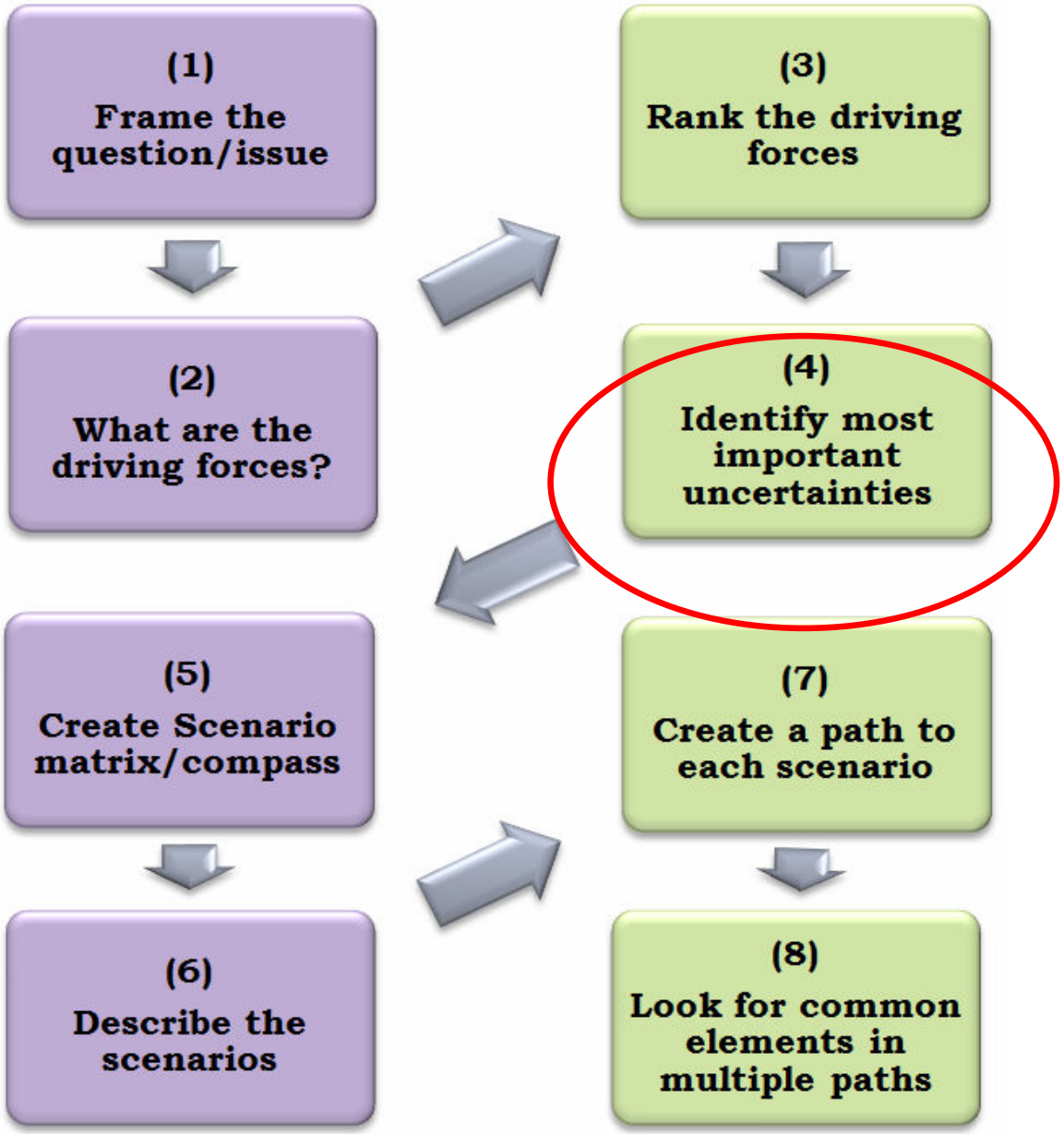
Set of plans for meeting alternative scenario conditions



Integrated plan to adapting to scenarios over time



Scenario Planning Steps



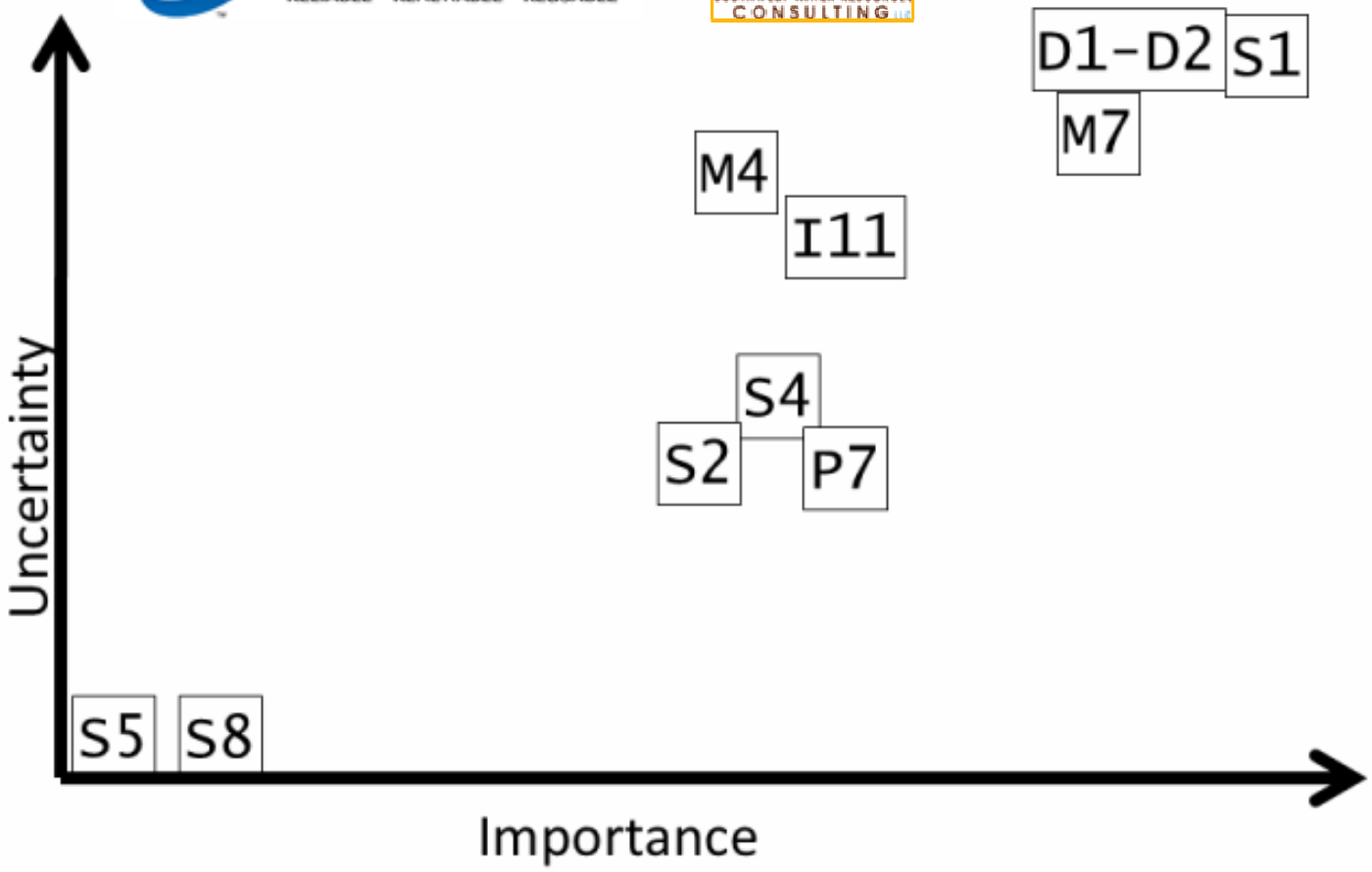
Interactive policy-maker ranking of uncertainties… iterative step 1

Pima County Department of Wastewater Management

TUCSON WATER

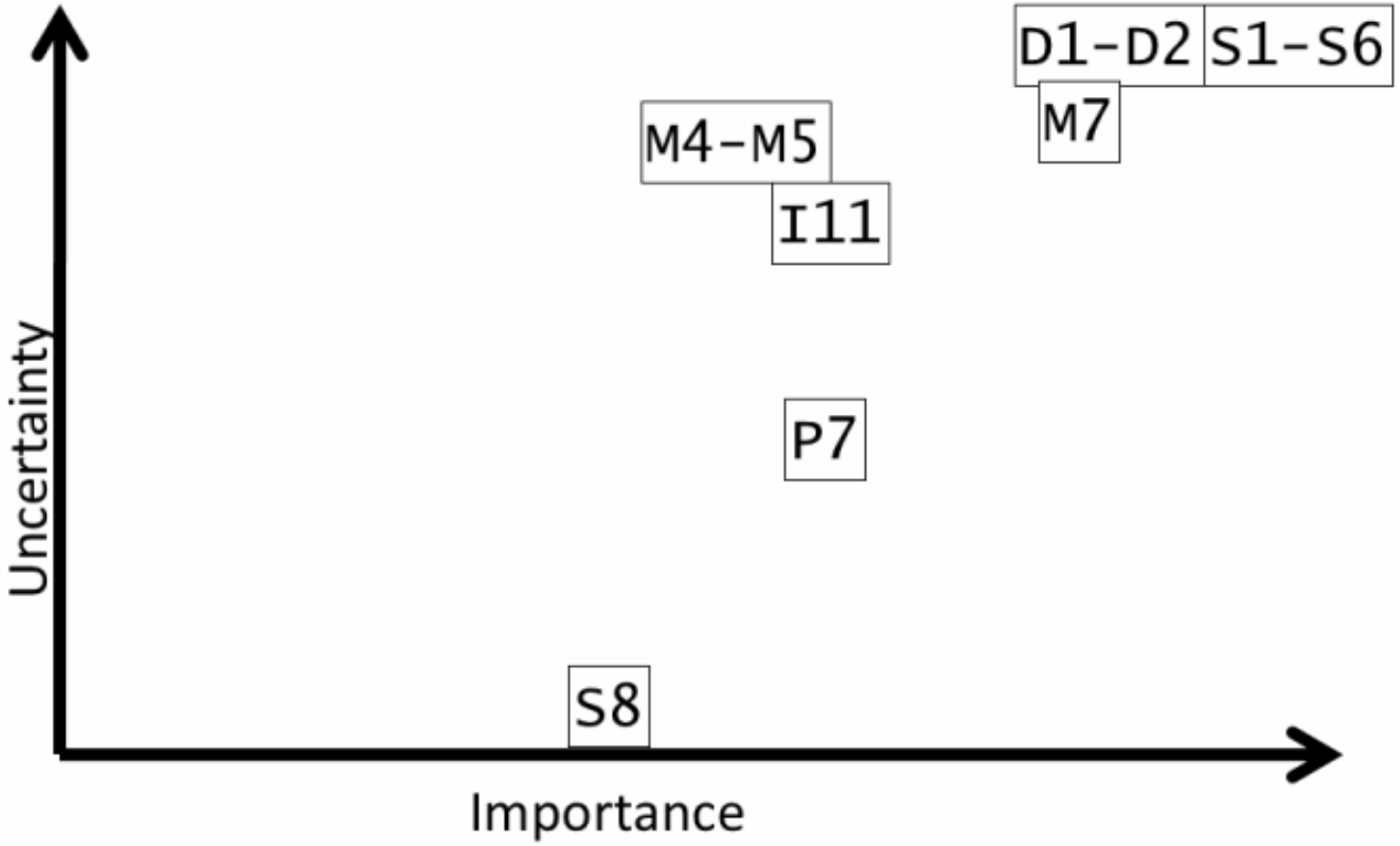
GLOBAL WATER
RELIABLE · RENEWABLE · REUSABLE

SWRC
SOUTHWEST WATER RESOURCES CONSULTING



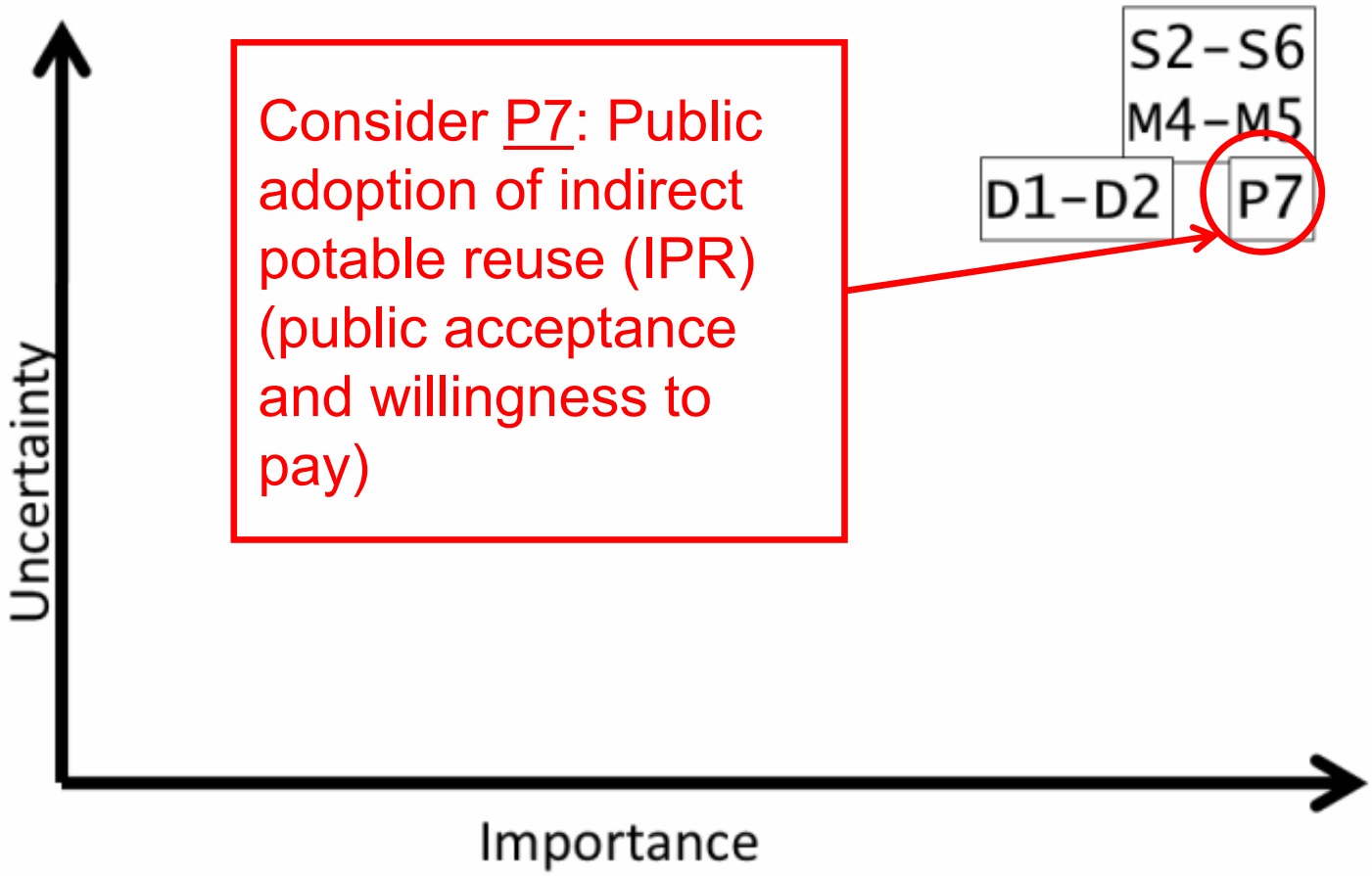
D1-D2: total water demand – pop density & residential demand
I11: state lands release, planning and disposition
M4-M5: supply uncertainty
M7: infrastructure cost
P7: Public adoption of IPR
S1: existing water supplies
S2-S6: potentially available water supplies
S8: spatial unavailability of 'banked' water

Interactive ranking of uncertainties… iterative step 2



D1-D2: total water demand - population density & residential demand
I11: state lands release, planning and disposition
M4-M5: supply uncertainty
M7: infrastructure cost
P7: Public adoption of IPR
S1-S6: all water supplies
S8: spatial unavailability of 'banked' water

Interactive stakeholder ranking of uncertainties… iterative step 3



Consider P7: Public adoption of indirect potable reuse (IPR) (public acceptance and willingness to pay)

D1-D2: total water demand - population density & residential demand

M4-M5: supply uncertainty

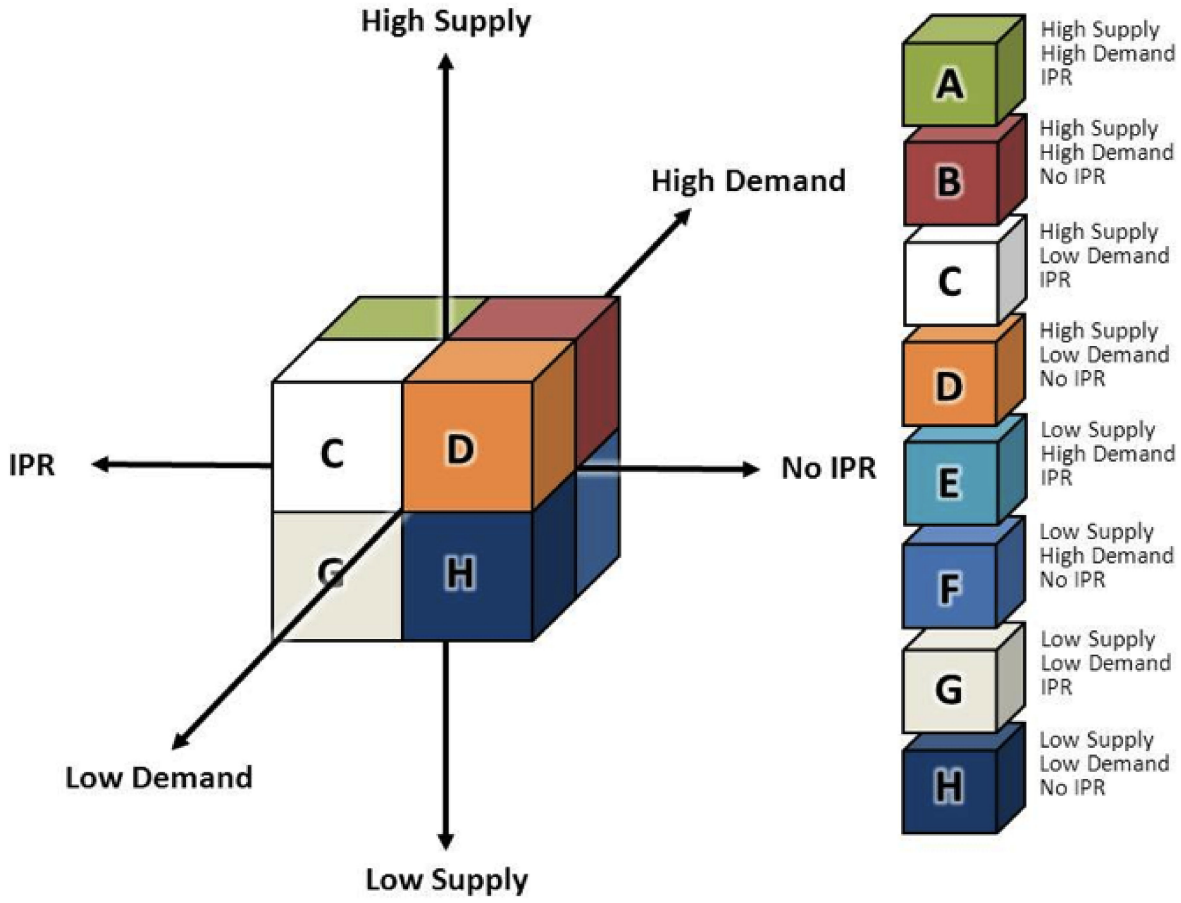
P7: Public adoption of IPR

S2-S6: potentially available water supplies

Plotting uncertainties

Public adoption of indirect potable reuse (IPR)

Supply, demand, IPR (public acceptance and) uncertainties prioritized by policy makers give 8 ($=2^3$) scenarios:



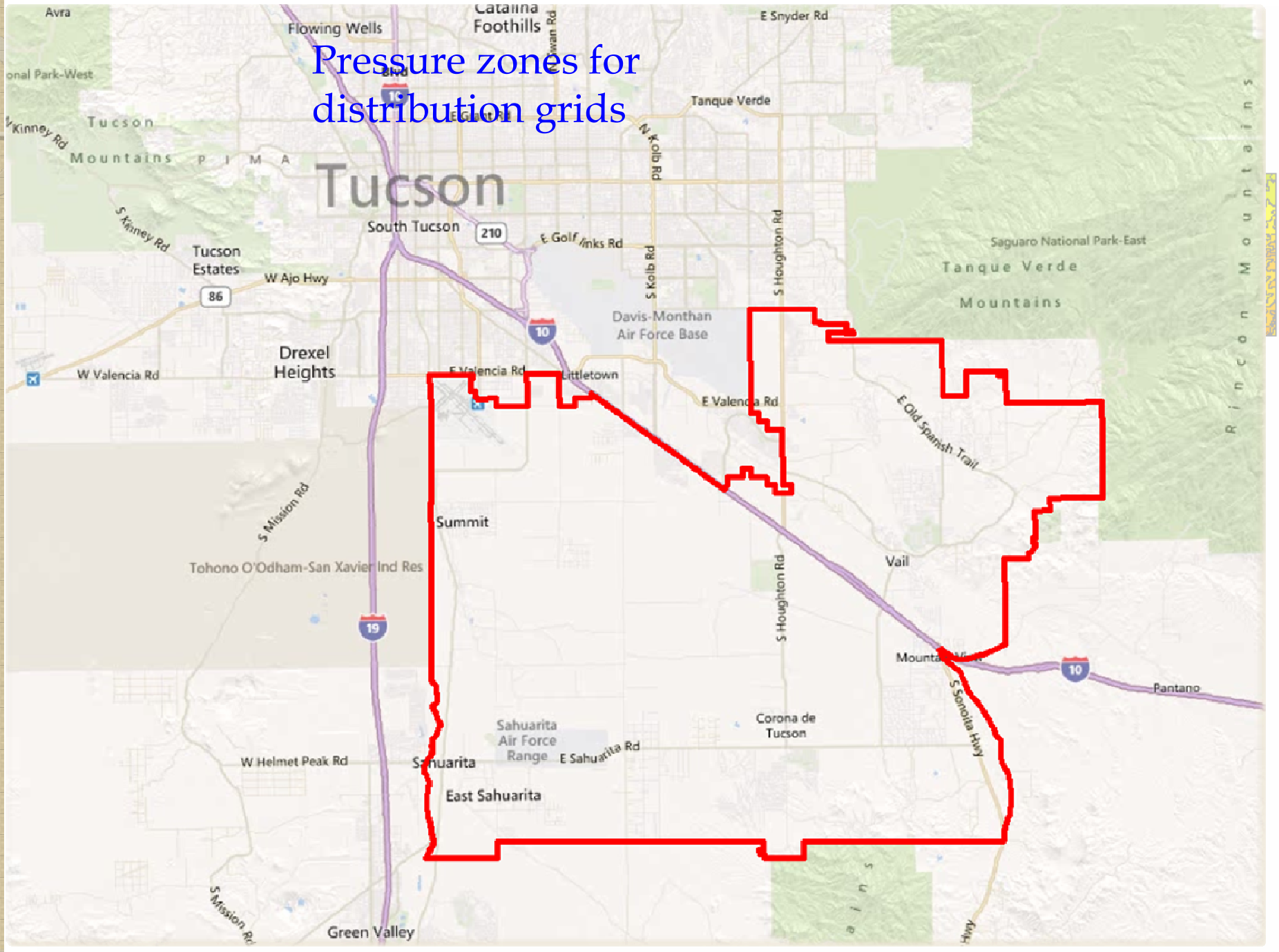
D1-D2: total water demand - population density & residential demand

M4-M5: supply uncertainty

P7: Public adoption of IPR

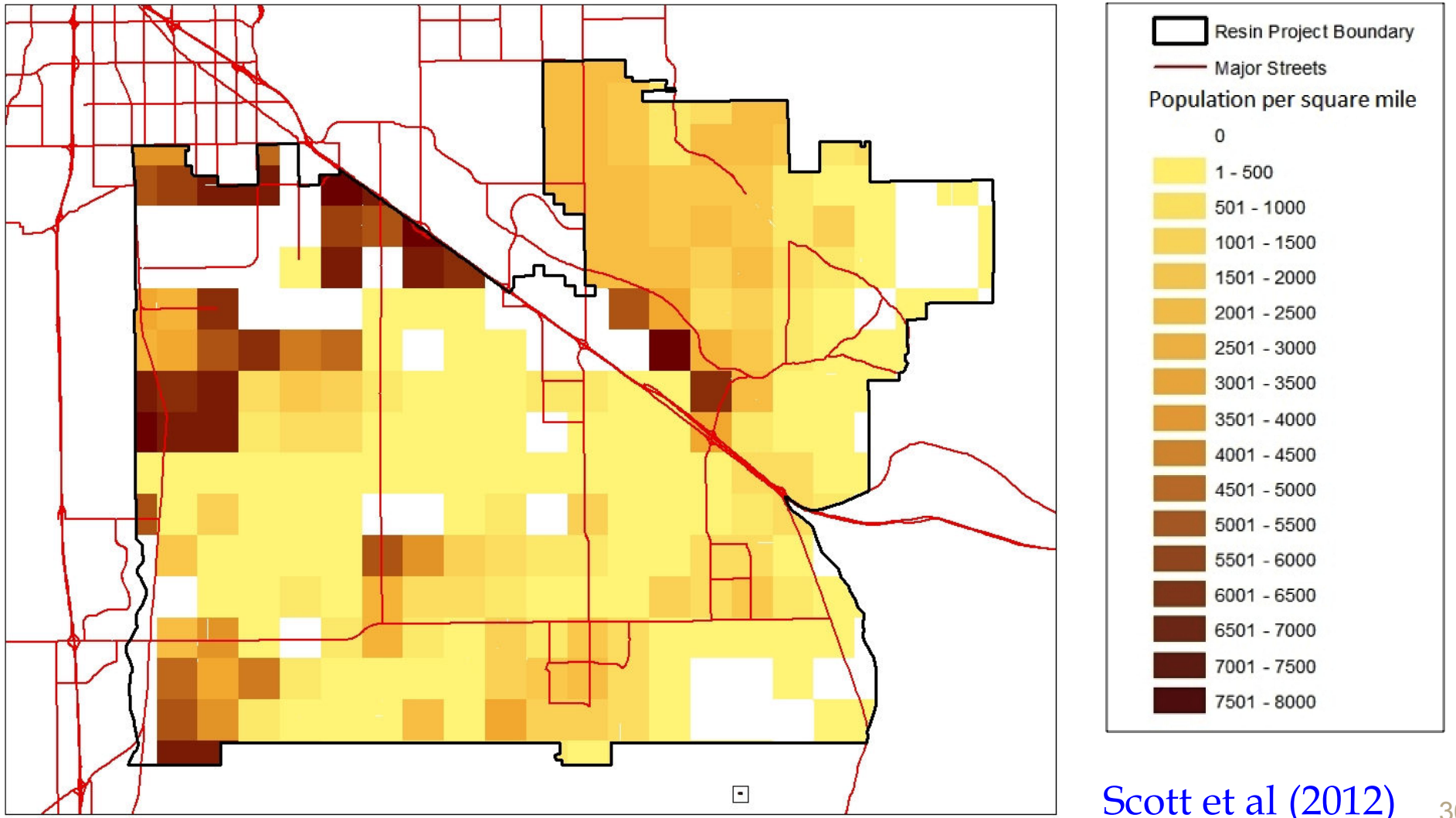
S2-S6: potentially available water supplies

Siting greenfield water supply & reuse



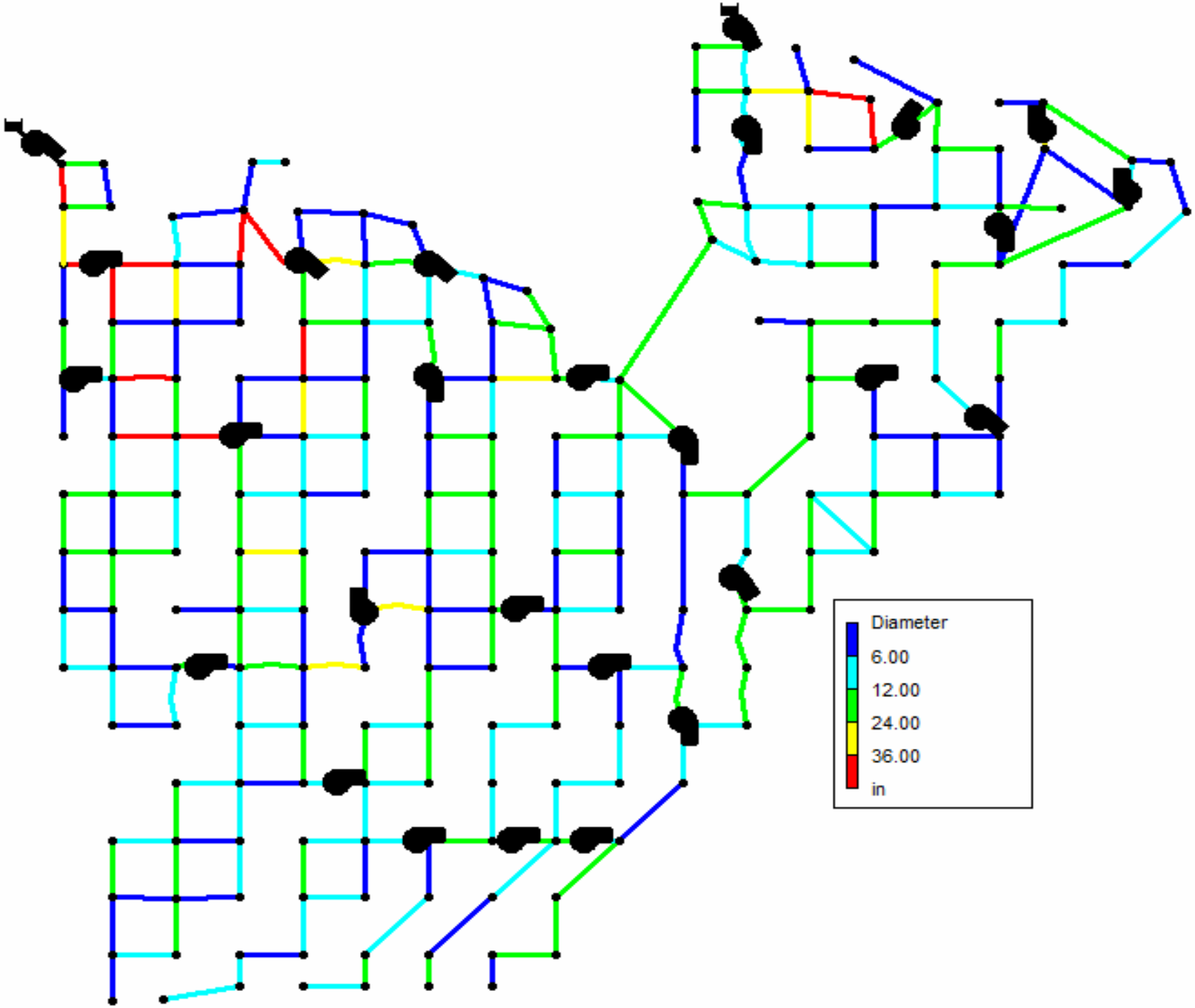
Reuse scenarios drive development pattern and rate

Projected 2050 population densities using the [illegible] model



Scott et al (2012)

Elements common to all scenarios



- **Utilizar productos oficiales, apoyados con datos y modelos científicos**
- **Prever y evitar inconsistencias, presentando resultados de investigación como complementarios**

Dejar espacios y tiempos no moderados para interacción entre los propios stakeholders

U.S.-Mexico stakeholder workshop in Tucson, Arizona (2009), on transboundary groundwater, including U.S. and Mexican federal, state, and local officials; NGO representatives; and researchers.

Para mayor información:

http://aquasec.org/wrpg/research-projects/water-reuse/

Sweetwater Wetlands