Meeting Materials are available online:
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Meeting Summary

Developing Narrative Scenarios Themes for the California Water Plan Update 2009

Thursday, November 29, 2007, 1:00 P.M. – 4:00 P.M.
Center for Collaborative Policy
815 S Street, Sacramento, CA

Meeting Objectives

1. Review important scenario concepts
2. Clarify the purpose and scope of scenarios in Water Plan Update 2009
3. Describe how scenarios fit into the short and long-term goals for Water Plan analysis
4. Describe a framework for scenario construction and analysis
5. Build a scenario factor table for use in constructing narrative themes for Update 2009 scenarios

Summary of Discussion

1. Lisa Beutler, meeting facilitator from the Center for Collaborative Policy (CCP) welcomed everyone to the workshop. This workshop began the process of building a framework for scenario construction that is based upon the scenario work done in Water Plan Update 2005. She explained that the feedback and outcomes for this workshop would be used for the Water Plan Advisory Committee meeting on December 19.

2. Rich Juricich, CA Department of Water Resources (DWR), gave a PowerPoint presentation describing the use of scenarios in the California Water Plan. He summarized the 3 scenarios used in Update 2005 and reviewed the stakeholder input DWR has received so far for scenarios in Update 2009. The 3 scenario narratives used in Update 2005 were:
    - Scenario 1 – Current Trends
    - Scenario 2 – Less Resources Intensive
    - Scenario 3 – More Resources Intensive

3. David Groves, Ph.D., RAND Corporation, gave a PowerPoint presentation recapping the scenario work done for Update 2005 and introducing a scenario analysis framework, called "XLRM", for Update 2009. Update 2009 will build upon the simple model of water demand analysis used in Update 2005. Scenarios will be expanded to consider water supply, climate change, water quality, and flood issues.

4. The "XLRM" scenario analysis framework is based upon research by RAND Corporation personnel. The framework distinguishes among 4 key elements **(see Figure 1 on pg. 6)**:

- **Exogenous Factors (X)** – factors outside the control of decision-makers that may prove important in determining the success of strategies.
- **Management Levers (L)** – near-term actions that, in various combinations, comprise the alternative strategies that are available to decision-makers. In the Water Plan's terminology, management levers are the "Response Packages (bundled levers)" and "Resource Management Strategies" (individual levers).
- **Relationships (R)** – potential ways in which the future, and in particular those attributes addressed by measures (M), evolves over time based on the decision-makers' choices of levers and uncertainties.
- **Performance Metrics (M)** – the performance standards that decision-makers and other interested communities would use to rank the desirability of various scenarios.

For more on the "XLRM" Framework,
see Lempert, Popper, and Bankes (2003)
http://www.rand.org/pubs/monograph_reports/MR1626/

The remaining portion of the workshop was devoted to developing a list of Exogenous (and uncertain) Factors to use as a basis for new narrative scenarios.

General Discussion:

5. A concern was raised about the difficulty in applying climate change model to a single watershed over an intermediate time period (i.e. year 2050) as opposed to a global analysis to the year 2100. Stakeholders are interested in how climate change models would apply to watersheds because the Integrated Regional Water Management Plans (IRWMPs) are being updated for the Prop 84 IRWM grant program.

   Responses:
   - The State is addressing climate change analysis through the Governor's Climate Action Team.
   - The Water Plan has a Climate Change Technical Advisory Group (TAG).
   - There are recent studies that address the issue of downscaling climate models to local watershed areas.

6. A participant asked about status of work by the Agricultural Issues Center at UC Davis to project future agricultural economic conditions and crop mixes. Rich Juricich responded that he had been working with DWR staff on future agricultural assumptions and was developing a scope of work for the Agricultural Issues Center – work is ready to begin pending availability of funding for the fiscal year.

7. Comments and questions regarding the XLRM model:
   - What is the baseline for Colorado River exports?
   - In general, executive decisions would be considered "Exogenous Factors" (X).

- With regard to the "Management Levers" (L), acknowledge that there are things outside of control of the water management community (i.e., requires action by other policy actors).
- Names of narrative scenarios should reflect assumptions rather than imply an outcome (i.e. "Higher Irrigated Acreage" rather than "More Resource Intensive").
- For climate change assumptions, will there be single set of assumptions for climate change all scenarios?
- It would be helpful to use a simplified graphic of the range of key factor assumptions for stakeholders to understand **(see Figure 2** on pg. 6**).**
    - It would also be helpful to have ranges set up so values go in a consistent "direction" from left-to-right – for example, in Figure 2, the concept of "naturally occurring conservation" goes against the grain of "crop water use" (less saving vs. more use). Note: factors may not be linear in complicated models.

8. Workshop participants reviewed and discussed a handout worksheet called "Factors Affecting Regional and Statewide Water Demands and Supplies." Participants were asked to comment on the list of Factors, the Types of Uncertainty, and the relationships between them. **Figure 3 (**on page 7) incorporates most of the feedback received by workshop participants. Participants gave the following input:

Factors

- Factors are not normatively "good" or "bad." Factors are conditions to take into account when modeling a scenario.
- A question was asked about the usability of factors that are characterized by trends and discrete events but are *not readily quantifiable* (such as flood peak flows).
    - David Groves responded that as long as a factor can be articulated, it can be used as a basis for a scenario. To illustrate this, he gave the example of how futurist Peter Schwartz used scenarios to help Shell Oil think about different (non-quantified) possibilities and ask the question, "what if". Contingent thinking enabled Shell Oil to anticipate the 1973 oil crisis and the collapse of the Soviet Union before they occurred.
- Several participants commented that organizing factors by "Water Demand" and "Water Supply" (as on the worksheet handout) was confusing, arbitrary, and subject to dispute. The demand/supply dichotomy was an artifact from the simple gap analyses done for previous Water Plan Updates; the dichotomy made less sense for the expanded scenario framework in Update 2009.
- It was observed that several of the factors in the worksheet handout were related to land use patterns. It was suggested that scenarios should pay attention to networks for commerce, industry, and goods movement.
- A participant cautioned care when characterizing "ranchettes" with regard to land and water use. Many ranchettes are involved in intensive agricultural production.

- A participant commented that the concepts of Surface Storage and Conveyance have been historically linked since CALFED – to decouple those concepts may require a cultural-shift rethinking of what the function of new surface storage should be.

New proposed Factors:

- "Urban Wastewater Discharge". Different from "Urban Runoff"
- "Technical Innovation/Breakthrough" (including genetically modified crops)
- "Floodplain Development"
- "Flood Threat Recognition
- "Flood System Integrity"
- "Flood Damage Reduction Opportunities"
- "Aging Infrastructure" (also "Natural Infrastructure")
- "Silting/Sedimentation of Facilities"
- "System Capacity"
- "Status of Endangered Species"
- "Solution for the Delta" / "Delta Fix"
- "Aging Infrastructure"
- Suggestion that "Population Distribution" should instead be "Urban Distribution" or "Urbanization."
- Suggestion have "Drought" as a separate factor from "Precipitation"
- Suggestion to separate "Precipitation" climate change *trend* component from year-to-year *variability*

New proposed Types of Uncertainty:

- "Economic Uncertainty"
- "Catastrophic Uncertainty" (fire, flood, earthquake, human-induced, and introduced species)
    - "Catastrophic" should be both a Factor and a Type of Uncertainty

Matching Factors with Types of Uncertainty

- Among the identified Factors, the predominant types of uncertainty were:
    - "Political Uncertainty"
    - "Economic Uncertainty".

  Also prevalent:
    - "Natural System Uncertainty"
    - "Cultural Practices Uncertainty"

Time Horizon

- Different factors have different significance in different times (State Government's 2008-09 FY budget vs. sea-level rise). What is important depends on the story being told (California in 2010 or California in 2050?).
- Starting conditions should be 2005 because Urban Water Management Plan (UWMP) data is available

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- Several participants raised concern about how new surface storage and conveyance projects would be characterized, since they can take several decades to approve, fund, plan, and build.

Suggested Scenario Themes

- Multi-Year Drought
  - performance in a (prolonged) drought year should be a performance metric
    - What management levers perform well in both wet and dry years?
- Reactive Mitigation vs. Proactive Environmental Stewardship
- Land Use Patterns
- Political Will vs. Natural System (particularly with regard to Surface Storage, Conveyance, and a "Solution for the Delta")

Meeting Outcomes

1. See **Figure 3** for a summary of input received by workshop participants. DWR's initial list of Factors and Types of Uncertainties was expanded.

Next Steps

1. Post meeting materials to the California Water Plan website.

2. DWR will work with SWAN on December 10 to draft proposal on quantitative deliverables for Update 2009 by December 2007. A final proposal is needed by March of 2008 to make it into the public review draft.

3. DWR will work with the Advisory Committee to develop narrative descriptions of the scenarios for the Assumption and Estimates Report by December 2007.

Attendance (26):

1. John Andrew, DWR
2. Katie Benouar, Caltrans
3. Lisa Beutler, CCP
4. Gail Cismowski, CVRWQCB
5. Mark Cowin, DWR
6. Richard A. Denton, Richard Denton & Associates
7. Terry Erlewine, State Water Contractors
8. Guido Franco, CA Energy Commission
9. David Groves, RAND
10. Kamyar Guivetchi, DWR
11. Steve Hatchett, WRE
12. Tom Hawkins, DWR
13. Robert Hodam, SWRCB
14. Rich Juricich, DWR
15. Jennifer Kofoid, DWR
16. Bob Languell, SWRCB
17. Ron Melcer, DWR
18. John Mills, Plumas, EID, TID
19. Lew Moeller, DWR
20. Terry L. Paxton, CESI
21. Betsy Reifsnider, Friends of the River
22. Morritt Rice, DWR
23. David Sumi, CCP
24. Marilee Talley, DWR
25. James Wieking, DWR
26. Charles Wynne, CA-OES

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Figure 1: The XLRM Framework: Four Key Elements of a Scenario Analysis

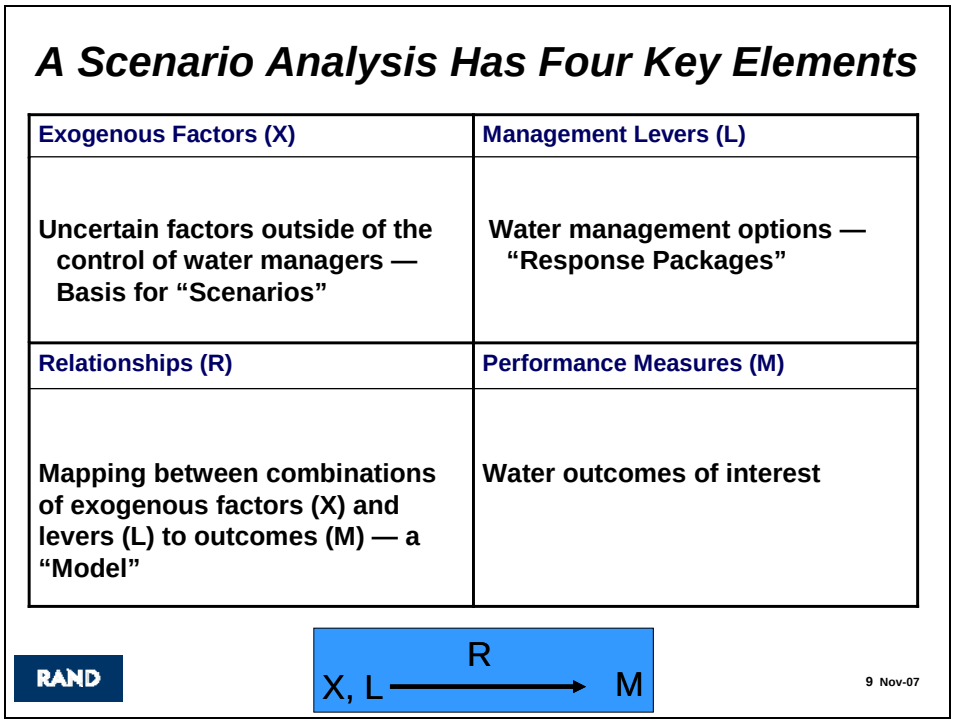

Figure 2: A Simple Graphic for Key Factor Assumptions

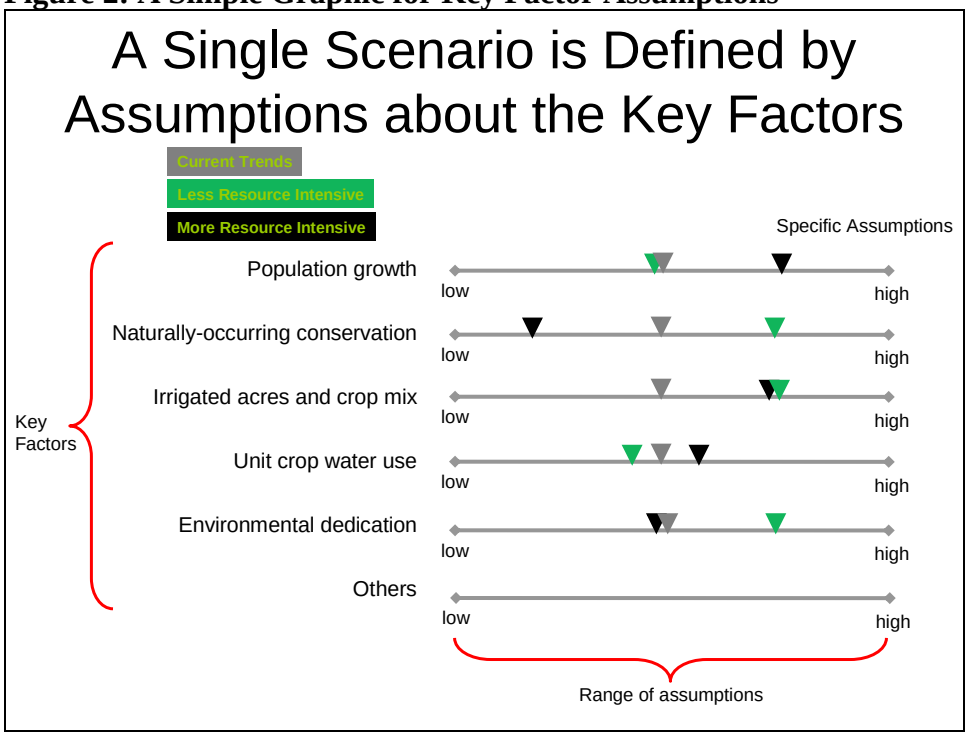

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Figure 3: Revised Worksheet – "Factors Affecting Regional and Statewide Water Demands and Supplies"

Factors Affecting Regional and Statewide Water Demands and Supplies (w/ Nov. 29, 2007 workshop feedback)

Land Use Patterns

FACTOR [1]	Types of Uncertainty (See key at bottom of page)								2010		2050	~~Data Sources~~
	NSU	FU	PU	CU	TU	IU	EU	CEU	Near Term	Mid Term	Long Term	Notes
~~Factors Primarily Affecting Water Demand~~	*(Demand/Supply dichotomy caused confusion and dispute, artifact from simple gap analysis)*											
Total Population				✓			✓					
Population Density			✓	✓		✓						
Population Distribution			✓	✓		✓	✓					
Total Commercial Activity							✓					Suggestion to change "Population Distribution" to "Urban Distribution"
Commercial Activity Mix							✓					
Total Industrial Activity							✓					
Industrial Activity Mix							✓					
Irrigated Crop Area (Includes irrigated land area and multi-crop area)	✓	✓	✓	✓	✓	✓	✓	✓				**These are all Land Use Patterns**
Environmental Water-Flow Based	✓		✓	✓								
Environmental Water-Land Based	✓		✓	✓								critical habitat
Per Capita Income				✓			✓					
Water Price		✓				✓						
Passive Conservation [2]			✓		✓	✓	✓					
Temperature	✓											*Suggestion to separate Temperature Factor into "**Air Temperature**" and "**Water Temperature**"*
Climate Change	✓											*this is a new proposed factor*
Technical Innovation/Breakthrough					✓							*this is a new factor; consider **genetic engineering** potential to reduce crop irrigation*
Floodplain development		✓	✓	✓		✓	✓					*this is a new proposed factor*
Flood threat recognition	✓		✓	✓	✓	✓						*this is a new proposed factor*
Flood system Integrity							✓					*this is a new proposed factor*
Flood Damage Reduction Opportunities				✓			✓					*this is a new proposed factor*
System Capacity												*this is a new proposed factor*
Status of Endangered Species												*this is a new proposed factor*
~~Factors Primarily Affecting Water Supply~~ ~~**Beneficial Uses?**~~												
Catastrophic events	✓											**Fire, flood, earthquake, human-induced, invasive species**
Sea-level rise	✓											
Precipitation - drought, multi-year drought, extreme weather events, changed patterns (time and place)	✓											Suggestion for separate factor on **Drought** Suggestion to separate **Precipitation climate change trend** component from **Precipitation Variability**
Snowpack	✓											
Colorado River Supply (Reliability)	✓		✓									
Delta Exports (Reliability)			✓					✓				
Flood Requirements			✓									
Energy Costs	✓		✓		✓		✓	✓				
Drinking Water Standards			✓	✓	✓							water quality ***standards*** are factors, not water **quality**
Ag Discharge Requirements			✓	✓	✓							
Urban Runoff Regulations			✓									
Urban Wastewater Discharge												*this is a new proposed factor: different from **Urban Runoff***
Recreation Demand			✓	✓			✓					
Desalting (Feasibility)			✓		✓		✓					
Recycled Water (Feasibility)			✓	✓	✓		✓					
Water Transfers Between Regions (Feasibility)			✓	✓		✓	✓					
Conjunctive Use and Groundwater Management (Feasibility)	✓		✓	✓	✓		✓					
Surface Water Storage (Feasibility)			✓	✓	✓		✓					Surface storage -- function and location are important! Conceptually, surface storage and conveyance are linked. For temporal considerations in surface storage and conveyance, it's "whether or not you can get approval now / later"
Conveyance Facilities (Feasibility)			✓	✓	✓		✓					
Delta Conveyance?												*suggestion to separate "Delta Conveyance" from conveyance within a region to move water for water recycling at IRWM*
"Solution for the Delta" / "Delta Fix"												
Aging Infrastructure												*this is a new proposed factor*
Silting/Sedimentation of Facilities												*this is a new proposed factor*
Environmental/legal mandates												
Silting/Sedimentation of Facilities												*this is a new proposed factor*

(1) Factors should be considered as an initial list that will be modified, as needed, as analyses proceed for the next Water Plan Update.

(2) Passive Conservation is the amount of background conservation (changes in plumbing codes, etc.) occurring independently from the BMP and EWMP programs.

Natural System Uncertainty (NSU) = Natural system variation (climate change, precipitation, etc.)
Financial Uncertainty (FU) = Financial feasibility (cost and funding)
Political Uncertainty (PU) = Political context (regulatory, balance of power)
Cultural Practices Uncertainty (CU) = Cultural context (social acceptance of technology, personal water practices, values for environment/economics)
Technical Uncertainty (TU) = Technical feasibility (engineering performance, technology availability)
Institutional Uncertainty (IU) = Institutional practices (mission, funding, capacity, values)
Economic Uncertainty (EU) =
Catastrophic Uncertainty (CEU) =