

Conjunctive Use Water Management Program

Workshop Report

PRESENTED BY

National Water Research Institute

IN COOPERATION WITH

Association of Ground Water Agencies
Metropolitan Water District of Southern California

Kellogg West Conference Center & Lodge
California State Polytechnic University
Pomona, CA

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FOREWORD

No one questions that the State of California, and indeed the entire planet, has an abundance of water. The age-old problem that continues to plague water managers, however, is that supplies are not necessarily where populations choose to settle or conduct business. For the water managers of California, the bifurcated problem is to strategically plan for the future while simultaneously providing for the present. Many issues compound the fundamental problem, not the least important being "drought" and its Latin cousin and antagonistic phenomena "El Niño."

In 1987, when the State of California updated its water master plan, considerable uncertainty was introduced regarding reliable and sustainable water supplies. As a result, the next decade saw the emergence of a question focused on whether or not there would be enough water for future generations.

The 1994 Updated State Water Plan introduced several recommendations. One group of recommendations was classified as Demand Management and included such options as water conservation, water banking, drought management, and land retirement. Another group of recommendations, classified as Supply Augmentation, included, among other options, Conjunctive Use or the more efficient use of groundwater basins through the integration of surface water and groundwater resources.

Since then, conjunctive use strategies have been examined, in some cases implemented, but not universally embraced throughout the State. Effective conjunctive use planning requires an integrated approach of both groundwater and surface water supplies as well as a willingness of all parties to collaborate in the successful implementation of such a plan.

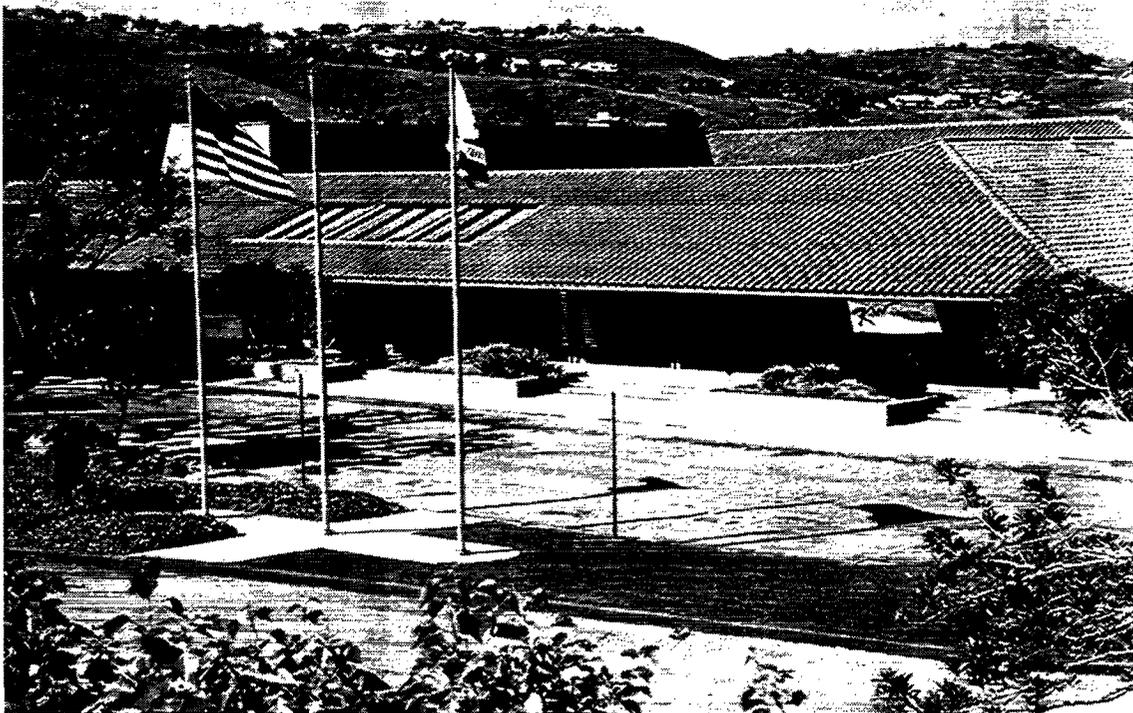
The National Water Research Institute organized this Nominal Group Technique (NGT) Workshop with its partners, the Association of Ground Water Agencies and the Metropolitan Water District of Southern California. The organizers were gratified by the insightful and forthright presentations as well as the open and professional discussions by all the participants in addressing the workshop question *What are the most significant impediments in implementing a cost-effective conjunctive use water management program in California?* The 25 participants represented local, regional, and state agencies, as well as the private sector, and came from both northern and southern California.

The organizers extend their sincere gratitude to the following individuals who worked behind the scenes to make the workshop run smoothly and effortlessly for the participants: Dr. William Gaither who facilitated the workshop; Patricia Linsky, Editor; Lucy Segura, Word Processor Coordinator; Joe Pezely, Graphics Illustrator; Dr. Robert Ames, Editorial/Graphics Assistant; Robert Torrence, II, Graphics Assistant; and Bobbie Jo Gibbs and Gerald Ingram, Word Processors. The workshop organizers also want to

express their appreciation to the staff of the Kellogg West Conference Center and Lodge who provided excellent accommodations and meals.

This document is the eleventh in the series of NGT Workshop Reports produced by NWRI that address significant and timely water issues. It presents the insightful and creative contributions of each participant as well as recommendations for follow-on activities to eliminate the impediments identified in the workshop

RONALD B. LINSKY
Executive Director
National Water Research Institute
Workshop Secretary



CONTENTS

Foreword	i	
Contents	iii	
Group Photograph of Participants	1	
Part 1: Working Groups' Reports	3	
Introduction	5	
Priority Ranking of Impediments to Implementing a Cost-Effective Conjunctive Use Water Management Program in California		
Priority 1	Inability of Local and Regional Water Management Governance Entities to Build Trust, Resolve Differences (Internally and Externally), and Share Control	7
Priority 2	Inability to Match Benefits and Funding Burdens in Ways That Are Acceptable to All Parties, Including Third Parties	11
Priority 3	Lack of Sufficient Federal, State, and Regional Financial Incentives to Encourage Groundwater Conjunctive Use to Meet Statewide Water Needs	15
Priority 4	Legal Constraints Impeded Conjunctive Use Regarding: Storage Rights, Basin Judgements, Area of Origin, Water Rights, and Indemnification	17
Priority 5	Lack of Statewide Leadership in the Planning and Development of Conjunctive Use Programs as Part of Comprehensive Water Resources Plans, which Recognize Local, Regional, and other Stakeholders' Interests	21
Priority 6	Inability to Address: Quality Differences in "Put" vs. "Take"; Standards for Injection, Export, and Reclaimed Water; and Unforeseeable Future Groundwater Degradation	25
Priority 7	Risk that Water Stored Cannot be Extracted When Needed Because of Infrastructure, Water Quality/Level, Politics, and Institutional/Contractual Provisions	29

Priority 8	Lack of Assurances to Address Third Party Impacts and to Increase Willing Local Citizen Participation in Conjunctive Use Projects	31
Priority 9	Lack of Creativity in Developing Lasting “Win-Win” Conjunctive Use Projects, Agreements, and Programs	33
Priority 10	Supplemental Suppliers and Basin Managers Have Different Roles and Expectations in Relation to Conjunctive Use	37
Part 2: NGT Workshop		41
Introduction		43
Priority Ranking of Impediments to Implementing a Cost-Effective Conjunctive Use Water Management Program in California		
Priority 1	Inability of Local and Regional Water Governance Entities to Build Trust, Resolve Differences (Internally and Externally), and Share Control	45
Priority 2	Inability to Match Benefits and Funding Burdens in Ways That Are Acceptable to All Parties, Including Third Parties	55
Priority 3	Lack of Sufficient Federal, State, and Regional Financial Incentives to Encourage Groundwater Conjunctive Use to Meet Statewide Water Needs	61
Priority 4	Legal Constraints Impeded Conjunctive Use Regarding: Storage Rights, Basin Judgements, Area of Origin, Water Rights, and Indemnification	65
Priority 5	Lack of Statewide Leadership in the Planning and Development of Conjunctive Use Programs as Part of Comprehensive Resource Planning, and Recognizing Regional and Stakeholders’ Interests	69
Priority 6	Inability to Address: Quality Differences in “Put” vs. “Take”; Standards for Injection, Export, and Reclaimed Water; and Unforeseeable Future Groundwater Degradation	75
Priority 7	Risk That Water Stored Cannot be Extracted When Needed Because of Infrastructure, Water Quality/Level, Politics, Institutional/Contractual Provisions	79

Priority 8	Lack of Assurances to Prevent Third-Party Impacts and to Increase Willingness of Local Citizens to Participate	83
Priority 9	Lack of Creativity in Developing Lasting “Win-Win” Conjunctive Use Projects, Agreements, and Programs	85
Priority 10	Supplemental Suppliers and Basin Managers Have Different Roles and Expectations in Relation to Conjunctive Use	87
Priority 11	Allocation of Regional Water Systems’ Costs on the Basis of Annual Water Sales Does Not Provide Incentives to Efficiently Use Supply	89
Priority 12	Inadequate Understanding of Water Management Among the California Citizenry and Politicians Making It Difficult to Build a Case for Conjunctive Use	93
Priority 13	Lack of Understanding of the Effect of Recharge and Extraction Within the Basin	95
Priority 14	Lack of Clearly Defined Shortage Allocation Plan for Imported Water	99
Priority 15	Lack of Public Debate/Understanding of What Water as a Commodity vs. as a Public Resource Means	101
Priority 16	Administrative Constraints Within Programs Resulting in In-Lieu Recharge Limitations, Failure to Maximize Wet-Year Storage, and Conflict in Dry-Year Production	103
Priority 17	Lack of Market Conditions, Policies, and Guidelines for Wheeling Water for Conjunctive Use	107
Priority 18	Lack of Agreement on Storage Calculation Methods Resulting in Concerns as to Amount of Water Stored, Appropriate Use of Incentives, Value of Incentives	111
Priority 19	Land Use Zoning Does Not Adequately Address Water Management, Water Contamination, and Recharge Issues	113
Priority 20	Lack of Adequate Surface Water Storage in California to Provide Flexibility to Maximize Conjunctive Use Programs	117
Priority 21	Lack of a Single Entity Overseeing Groundwater Recharge/Recovery Operations, Target Aquifers, and Points-of-Use	119

Priority 22	Lack of Awareness of the Real Expense of Properly Designed Groundwater Management and Conjunctive Use Programs	123
Priority 23	TDS Level of Colorado River Water	127
Priority 24	Current Uses of Existing Facilities May Conflict with the Realization of Conjunctive Use Opportunities	131
Priority 25	Lack of Consistent Regulatory Approval Process	135
Priority 26	Long-Term Hydrology vs. Short-Term Weather Events and the Misconception That Engineering Analysis Can Provide Certainty	137
Strength of Feeling of Participants and Subgroups of Participants		139
Table 1	All Impediments Ranked by All Participants	140
Table 2	All Impediments Ranked by Local Agency Participants	142
Table 3	All Impediments Ranked by Regional Agency Participants	144
Table 4	All Impediments Ranked by State Agency Participants	147
Table 5	All Impediments Ranked by Private Sector Participants	148
Appendices		151
A.	Glossary of Abbreviations and Acronyms	153
B.	List of Workshop Participants	154

PARTICIPANTS

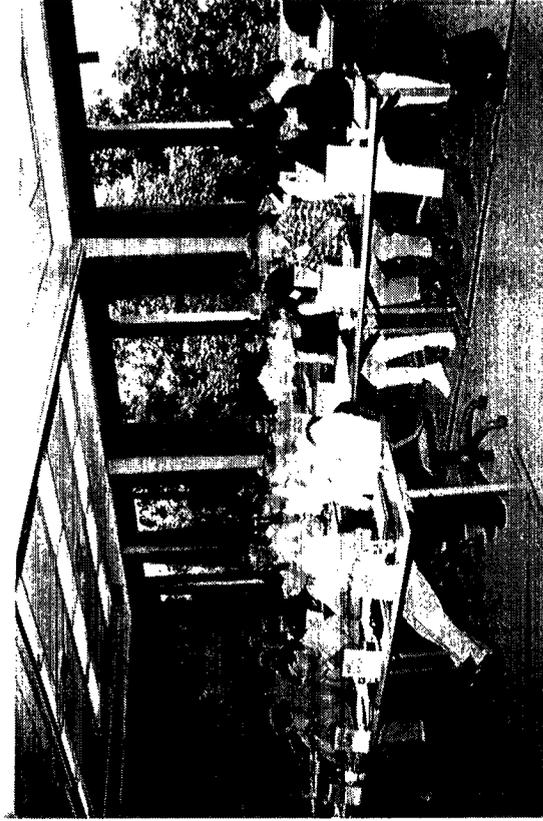


Top Row: William R. Mills, Donald Harriger, Anatole Falagan, Harold T. Glaser, Robert McVicker, Thomas C. Haslebacher, Richard W. Hansen, Robert Yamada

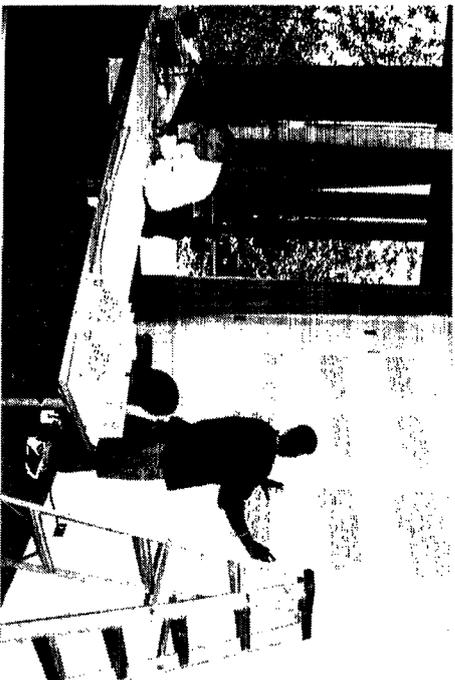
Standing: Thomas Erb, Joe Grindstaff, Edwin James, David Purkey, Stan Sprague, Darryl Miller, Wyatt Won, Anthony M. Saracino, Michael B. Young, Richard Atwater, Ronald Palmer

Seated: Brian G. Thomas, Edward Means, Carl Hauge, Bobbie Jo Gibbs (Word Processor), Katherine Kelly, Patricia Linsky (Editor), Nina Jazmadarian, Steve Bachman, Lucy A. Segura (Meeting Coordinator and Lead Word Processor)

Floor: Traci Stewart, William Blomquist, William S. Gaither (Chair), Robert S. Ames (Editorial and Graphics Assistant), Gerald Ingram (Word Processor), Robert Torrence (Graphics Assistant), Joseph Pezely (Graphics), Ronald B. Linsky (Secretary)



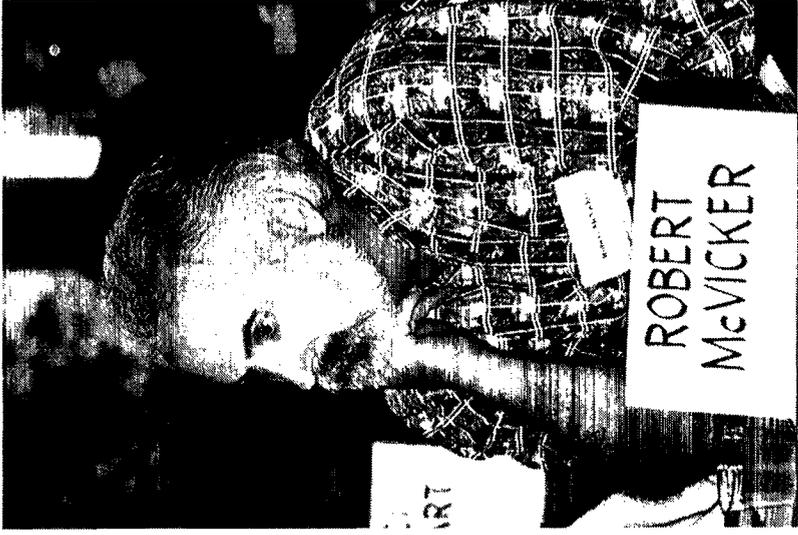
Working Groups' Reports



INTRODUCTION

Summary Descriptions of Highest Priority Impediments to Implementing a Cost-Effective Conjunctive Use Water Management Program in California

The following summary descriptions of priority impediments to implementing conjunctive use projects were prepared by small working groups of participants. Each of these ten descriptions represent the first step in consolidating and refining the highest priority major impediment areas originated by the participants in the NGT Workshop described in Part 2 of this report. The final section of each impediment description lists individuals and/or organizations who the working group recommends be invited to become Task Force members when and if the process of developing action plans to overcome these impediments moves forward. Also, after each summary description are comments by other participants.



Inability of Local and Regional Water Management Governance Entities to Build Trust, Resolve Differences (Internally and Externally), and Share Control

WORKING GROUP MEMBERS:

Glaser, McVicker, and Palmer

Impediment description:

In order to be successful, conjunctive use programs typically require cooperation between two or more participants. If this cooperation does not exist, then programs are difficult, if not impossible, to negotiate, start-up, and implement. At least two types of relationships between participants are important to consider: (1) Relationships *internal* to the composition of a groundwater management entity. These are usually parties to a judgment or pumpers who are members of a groundwater management entity. (2) Relationships *external* to the groundwater management entity. Typically these are between the groundwater entity and an imported water supplier (e.g., Metropolitan Water District of Southern California [MWD]).

The foundation to cooperative relationships is trust and understanding of the goals, needs, priorities, and unique concerns of each party. Lack of trust and understanding are almost always cited as the basic reason why a conjunctive use agreement cannot be negotiated in the first place. Both local groundwater management entities and MWD have expressed concerns that the other party has difficulty in understanding opposing perspectives. For example, MWD may see the big picture and grasp regional or statewide issues at the expense of local or retail level issues and vice-versa.

Control over groundwater basin facilities operations has also emerged as an important issue. Groundwater management entities wish to retain control of their basins in order to meet requirements dictated by judgments or legislated charters. MWD is viewed as a threat to management and operational control. Historical investments by groundwater basin pumpers are threatened by this potential loss of control as MWD increases its presence in basin activities, takes title to stored water, and invests in groundwater

management, recharge, and extraction facilities. Ultimately, groundwater management entities fear loss of water rights to MWD as a result of ceding control.

MWD, on the other hand, wishes that groundwater basin entities would cede significant control. They view this as necessary to ensure that regional benefits of conjunctive use are realized during times of drought or emergency. Also, MWD has expressed frustration that each groundwater basin has a unique legal and political structure, and that there is no “one stop shop” for negotiating agreements. Experience demonstrates that internal dissent among basin management governance entities, even by one member, can block agreements.

Importance:

As stated by one Member Agency General Manager, there is lack of trust that a “deal is a deal.” The process of negotiation and development of a conjunctive use agreement becomes inefficient, costly, and time-consuming. Even if agreements are prepared with explicit terms and conditions for performance, the pervasive lack of trust on both sides leads to uncertainty as to whether either party will act in good faith during periods of drought or emergency. This results in missed opportunities, or agencies who look beyond the regional imported water supplier to other sources that may have inherently higher costs or problems to be overcome in negotiating and implementing conjunctive use.

There are several important ramifications of this lack of trust from the perspective of the local groundwater entities:

- Local groundwater entities want and need operational control of program facilities in order to fulfill their basic basin management responsibilities (i.e., water quality and water levels). One fear of losing control is that during a drought, MWD may believe that its regional water needs outweigh local groundwater basin needs.
- Imported water suppliers, in meeting their reliability goals, become overly focused on overall regional needs and lose sight of local groundwater entity needs.
- Loss of groundwater rights may result in risk of losing free water or buying of expensive replacement imported water.

From MWD’s point of view, these issues are significant:

- Unwillingness to cede control prevents a win/win outcome and pits “haves” vs. “have-nots” resulting in increased social costs for essential resources. Because each basin is different, there are numerous hurdles to cross. Each is a political minefield, and there is a fear of MWD.

- It only takes one party of a groundwater management entity to block a deal.
- Programs that are paid for regionally should offer some value to all agencies paying for conjunctive use.

Failure to agree on cost of storage results in reduced conjunctive use and diminished overall water resource management benefits.

An important aspect of this impediment is the fact that conjunctive use agreements may not be tested for years. It will be difficult to prove that trust or contract provisions work out, even for small demonstration scale projects, because it is impossible to predict the onset of the next drought.

Suggest an approach to overcoming the impediment:

On this, there seems to be consensus. This impediment may simultaneously be the most difficult, yet most important, to solve. A number of ideas have been advanced which should be considered in formulating an overall approach:

- Invest more time in education of conjunctive use benefits and issues to staff (e.g., engineers/managers, operations and legal), decision-makers (e.g., elected and appointed officials), and the public. Beneficiaries need to be clearly identified and benefits quantified with benefits and risks clearly aligned.
- Communicate more often, perhaps on a regularly scheduled basis, among all participants and stakeholders.
- Adopt a facilitated, structured consensus-building approach through local and regional partnerships. Start with development of an acceptable set of flexible conjunctive use principles.
- Collaborate on legislative advocacy on topics of common interest (e.g., relief from Superfund liability or state and federal funding).
- Establish a dispute resolution board.
- Initiate cooperation on more modest demonstration-scale projects that are smaller and have less at stake. Retail agencies may be in a better position to take the lead on these.
- Start development of programs from the lowest level in order to build consensus from the bottom-up.
- Develop alternative approaches to handling judgment provisions.

- Write detailed performance commitments and operational criteria, along with remedies, into principles and agreements.
- Be prepared to be flexible, or “think out of the box” when specific provisions meet with refusal or become deal-breakers.

On a more controversial note, the following ideas were developed:

- Adopt a cost-based approach to pricing of storage, with no profit.
- Establish a single authority or super agency in each basin to simplify current arrangements. This may provide MWD with the “one-stop shopping” that it desires and would internalize benefits and costs within a single entity.
- Convert groundwater basins to a public resource in order to broaden public investment appeal.
- Hire a think tank to conduct a theoretical exercise to erase geopolitical boundaries statewide to develop a new management strategy.

In any case, all parties agreed that more leadership is required at the local and regional levels to move forward in building trust and forging new cooperative relationships.

Recommended task group membership:

- AGWA Representatives
- MWD
- Member Agency Representatives
- Water Resources Consultants
- Department of Water Resources
- Special Interest Groups

Comments:

“Create a neutral ‘groundwater conjunctive use’ facilitator office at California DWR to bring local parties together to resolve problems (ombudsman office concept). The purpose of this office would be to provide technical assistance in resolution of disputes (not be an advocate of a preferred policy position).” - Rich Atwater

PRIORITY 2

Inability to Match Benefits and Funding Burdens in Ways That Are Acceptable to All Parties Including Third Parties

WORKING GROUP MEMBERS:

Falagan, Thomas, and Yamada

Impediment description:

- The benefits of conjunctive use programs, as perceived by the surface supplier (i.e., funding agencies), are less than the costs of developing facilities for those programs. Basin agencies argue that the value of storage in the basin is not totally reflected in the analysis.
- Establishing a program's feasibility as a cost-based assessment of facilities and operations does not appear to provide sufficient incentive to develop additional conjunctive use.
- With any potential conjunctive use agreement, each party sees the other benefiting more, at the same time that they see themselves bearing a higher share of the risk(s).
- Surface water suppliers are unwilling to change the status quo without knowing how the value and benefits of conjunctive use compare with other resource alternatives.
- Across the state, there is a lack of a sufficiently inclusive process that identifies and addresses third party issues associated with conjunctive use.

Importance:

A regional consensus toward changing the current status quo regarding conjunctive use cannot occur until agreement is reached as to the price the region should pay for conjunctive use in exchange for the benefits received.

Currently, non-basin agencies are reluctant to fund conjunctive use programs when the cost and value of those programs have not been compared to other competing resource alternatives (e.g., option transfers). In addition, non-basin agencies are concerned that they would be funding the development of supplies elsewhere in the region and that these supplies may not increase imported supplies to non-basin agencies in dry years.

Suggested approach to overcoming the impediment:

The following actions are suggested as means to overcome this impediment:

- Complete regional evaluations of the economic and financial benefits of conjunctive use in the context of other resource alternatives (e.g., transfers, recycling, conservation). This evaluation process should include both technical and outreach components in which all stakeholders, including third parties, have an opportunity to participate and contribute.
- Introduce legislation that would make available state funds (e.g., CALFED) for conjunctive use programs as part of the statewide solution to California's long-term water needs.
- Develop contractual arrangements between surface water suppliers and groundwater agencies that explicitly recognize the roles and responsibilities of each player. These contracts would provide certainty regarding financial impacts and performance expectations and would link total funding with the value of the expected benefit. Contracts would be specific to each basin, allowing for the necessary flexibility to operate the basin locally, while meeting regional objectives for enhanced yield of surface water systems.
- Develop regional shortage allocation plans that specify the performance expectations of groundwater basins and surface water systems. Such plans would provide certainty regarding the availability of imported water to non-basin agencies during a shortage.

Recommended task group membership:

Focus: Regional evaluation of economic and financial benefits of conjunctive use versus other alternatives.

Membership:

- Member Agencies and AGWA Agencies
Sprague, Stone, Jones, Won, Yamada, Hess, Kendall, Hansen, Palmer, Gewe
- Metropolitan Water District
Man, Thomas, Young, Rodrigo, Jazmadarian

Focus: Legislation to make state funds available for conjunctive use (e.g., CALFED)

Membership:

- AGWA Representatives
- Conservation Groups
- Environmental Groups
- CUWA – Buck
- ACWA - Reeb

Focus: Complete Metropolitan's Water Supply and Drought Management Plan and include performance expectations with relation to conjunctive use.

Membership:

- Rate Refinement Group - Metropolitan and Member Agencies
- Metropolitan - Thomas, Rodrigo, Blair, Jazmadarian





Lack of Sufficient Federal, State, and Regional Financial Incentives to Encourage Groundwater Conjunctive Use to Meet Statewide Water Needs

WORKING GROUP MEMBERS:

Atwater, Grindstaff, and Won

Impediment description:

Lack of outside sources of funds to implement a conjunctive use program is an impediment. Generally, there is very little local money available to build additional conjunctive use facilities or to buy additional replenishment water required for a conjunctive use program. Agencies have little incentive to take the risks to develop a program.

Conjunctive use water management provides significant statewide storage benefits. The State of California (e.g., DWR, SWRCB, CALFED) has provided insignificant financial resources and inconsistent institutional leadership on implementing conjunctive use management.

Importance:

All conjunctive use programs require an investment in facilities and/or water and thus require capital. Agencies need outside sources of funds or financial incentives to pay back capital expenditures and operating costs.

Suggest an approach to overcoming the impediment:

- Recommend MWD revise its financial incentives and conjunctive use agreement principles to be generally consistent with the Raymond Basin Management Board draft agreement (and thus have one comprehensive groundwater conjunctive use program incorporating seasonal storage service, Groundwater Resources Program/Local Resources Program, and cooperative storage/cycle agreements).

- Recommend state financial assistance for groundwater conjunctive use grants and loans; \$500 million (water bonds) to support CALFED's ten-year interim plan.
- Fund pilot/demo conjunctive use projects at a maximum of \$50 million per project with state bond fund.
- Federal funding should also be explored as a part of CALFED.

Recommended task group membership:

- AGWA - Bill Mills
- MWD - Brian Thomas
- CALFED - Lester Snow
- California DWR - Dave Kennedy
- SWRCB - Walt Petit
- USBR - Roger Patterson
- CUWA - Bryon Buck
- Kern County Water Agency - Tom Clark

Comments

“I recommend the report include a statement on pursuing linkage between optimization of southern California conjunctive use projects on a regional basis with the Water Efficient Common Program of CALFED rather than the conjunctive use portion of the three CALFED alternatives. Much of what MWD is trying to accomplish regarding conjunctive use is to link the operation of individual projects to improve regional water supply reliability. This is very consistent with the Water Use Efficiency Common Program.” - Katherine Kelly

“Give the fast moving pace of the CALFED process careful consideration of the appropriate point to insert southern California conjunctive use issues needs to occur and be coordinated with urban representatives and other stakeholders in the process.” - Ed Means

Legal Constraints Impede Conjunctive Use Regarding: Storage Rights, Basin Judgments, Area of Origin, Water Rights, and Indemnification

WORKING GROUP MEMBERS:

James and Miller

Impediment description:

Legal constraints are primarily due to existing legal circumstances or precedents regarding water rights. These water rights are typically characterized by a wide divergence of unique legal applications to specific groundwater basins. In fact, a “one-size fits all” set of legal principles is virtually impossible.

The implementation of a new conjunctive use project typically raises new legal issues or requires modifications to the existing water rights. Local pumpers within and/or adjacent to conjunctive use areas are often concerned that a conjunctive use program will result in the loss of their rights. Water importers are concerned with assuring their right to successfully bank and extract “their” water when needed. Property owners overlying the groundwater basin are concerned with preserving their rights for continued pumping and storage of water.

In adjudicated basins (common in southern California), water and pumping rights are limited and controlled by a basin watermaster that implements a court ordered allocation of water. A new conjunctive use project must work within the constraints of the adjudication or be able to justify a modification to the adjudicated rights.

When water is imported into a groundwater basin or new pumping begins, a concern can arise regarding the water rights that accompany the water from the “area of origin.” Also, new legal issues can arise from implementing a conjunctive use project, such as indemnification issues for future unknown circumstances.

All of these legal concerns can significantly constrain or impede the success of a conjunctive use project.

Importance:

- Storage Rights – Conjunctive use works by having agencies utilizing unused storage capacity in a groundwater basin. To many groundwater agencies, storage rights are considered the same as property rights that belong to the overlying landowners. This distinction is important because it prevents importation agencies from claiming the right to any unused storage in a basin.
- Basin Judgments – Most groundwater basins in California are operated under an adjudication, basin management plan, or AB 3030 plan (those basins that do not have a basin management plan should consider establishing a plan). Because each basin operates under a different management plan, establishing rigid conjunctive use principles is not practical.

Because basin governance varies considerably regarding export of water from the basin, water quality parameters, indemnification authority, a “one-size fits all” set of principles is virtually impossible.

- Area of Origin – The California Water Code related to Area-of-Origin is vague and has been used by neighboring agencies or counties to prevent or hinder the exportation of water out of a groundwater basin. This use of the Area-of-Origin concept can hinder agencies from developing workable conjunctive use programs.
- Water Rights – If local pumpers or their interest groups are not convinced that their water rights are protected, they will attempt to delay or prevent the implementation of conjunctive use programs. Water right issues can be raised to challenge the issuance of permits, land use approvals, CEQA approvals, and water rights filed with the State Water Resources Control Board. The results of any of these challenges will often result in litigation filed against the conjunctive use project.
- Indemnification – Requiring importation agencies to indemnify local groundwater agencies for any potential impacts could result in projects becoming economically infeasible. Fear of huge financial costs in the future may prevent projects from being developed.

Approach to overcome the impediment:

Approaches to overcoming this impediment are provided for the (1) development of a specific conjunctive use project, and (2) development of a generic framework for implementing conjunctive use programs in California. Discussion of each approach is provided below.

- Approach for a Specific Conjunctive Use Project

When a conjunctive use project is being planned, legal constraints should be identified when evaluating the “fatal flaws” of the projects. A project-specific approach to resolving legal constraints can then be implemented and monitored as the project progresses. This approach will avoid mid-project discoveries of potential fatal flaws regarding legal constraints.

An example of this fatal flaw approach is the issue of Area-of-Origin. If this legal concept appears to be a potential fatal flaw, legislation could be introduced to amend or modify the California Water Code.

During the implementation of a conjunctive use project, decision makers representing the project stakeholders should be directing their attorneys to solve legal constraints and accommodate the leadership of the project.

- Approach to Developing a Generic Framework for Implementing Conjunctive Use Programs

Several principles need to be developed to support the successful development of conjunctive use programs in California. Principles that relate to legal constraints are provided below.

- Limit liability. The liability of agencies that import water into groundwater basins, as well as agencies responsible for managing groundwater basins, needs to be limited so each agency can accept a reasonable risk of “doing business.”
- Clarify storage and water rights. The storage rights of importing water agencies, as well as the water rights of the existing groundwater agency(s), needs to be clarified. General principles for guiding the expectations of water rights for conjunctive use water are needed.
- Clarify operational agreements. General principles for the operational expectations regarding when, how, and the amount of water that can be put into and taken out of groundwater basins need to be clarified.
- Storage rights as side agreements in adjudicated basins. In adjudicated basins, guiding principles are needed for clarifying the storage rights of an importing water agency. Side agreements that document and protect the storage right holder are needed rather than amending the adjudication of the basin.

Recommended task group membership:

For Southern California agencies located in Metropolitan service area:

- Traci Stewart
Chino Basin Watermaster
- Carol Williams
Main San Gabriel Basin Watermaster
- William Mills
Orange County Water District
- Ron Planner
Raymond Basin Management Board
- Mel Blevins
Upper Los Angeles River Area Watermaster
General Manager
Water Replenishment District of Southern California
- Donald Harriger
Western Municipal Water District
- Michael Young
- Edward Means
- Debra Man
Metropolitan Water District

Comments:

“Because I’m an engineer, I find discussions of liability, indemnification, and risk allocation to be fascinating. I observe that risk is ‘in the eyes of the beholder.’ The comment that we all need to control our legal counsel is well put.

From a practical standpoint, parties to a conjunctive use negotiation should agree to take a new approach when refusal is met on a deal breaker. This could be an automatic circuit breaker which could trigger a step back, a change of perspective by researching other parties or means of mitigating the risk, or outside input on the reasonableness of each parties’ position. Often, legal counsel gets hung up on avoiding risks which we might otherwise be willing to assume.” - Harold Glaser

PRIORITY 5

Lack of Statewide Leadership in the Planning and Development of Conjunctive Use Programs as Part of Comprehensive Water Resources Plans, which Recognize Local, Regional, and Other Stakeholders' Interests

WORKING GROUP MEMBERS:

Hauge, Mills, and Young

Impediment description:

Within California some conjunctive use programs have been implemented. There is a potential for many more such programs. The hydrogeology of California is such that there is a very large potential for additional groundwater storage in many basins, some of which already contain significant water transport systems. Recently, increased water demand has created an interest in developing more conjunctive use programs, and particular interest in multi-agency conjunctive use programs. There has been no statewide leadership to facilitate the development of multi-agency, regional programs. This impediment has resulted in the following deficiencies:

- No comprehensive regional planning between stakeholders.
- No statewide drought management policy.
- No consideration of conjunctive use as an emergency water storage program.
- Lack of social agency agreement on water resource management strategies that enable conjunctive use.
- No leadership to identify potential programs and build consensus.

- Little coordinated water resources management, resulting in limited conjunctive yield.
- Lack of identification, evaluation, and implementation of all conjunctive use opportunities.

Importance:

- The opportunity to store additional water is gained.
- A comprehensive plan would help address equity issues between participants.
- Surface water and groundwater use could be coordinated.
- Coordinated studies by agencies, such as CALFED and DWR, with statewide interests can bring divergent interests together for the common good.
- The yield of the state's water supply could be increased.
- Several potential conjunctive use programs, such as American Basin, Raymond Basin, Chino Basin, etc., could be expedited.
- The most cost-effective programs could be identified and implemented.
- Water supplies throughout the state would be more reliable.

Suggested approaches to overcome the impediment:

- CALFED or DWR should be directed by the administration or the legislature to develop statewide conjunctive use management studies that identify conjunctive use possibilities and facilitate implementation. These programs should be developed cooperatively with local water management agencies.
- Alternatively, a blue-ribbon committee consisting of members of the water management community and other stakeholders could be appointed and, using CALFED or DWR staff, could develop conjunctive use possibilities and facilitate their implementation.
- Conjunctive use quantity goals should be set by legislation. A committee consisting of a cross-section of the water management community and other stakeholders could make recommendations for these conjunctive use goals. Enabling legislation to support the goals of conjunctive programs should be enacted.
- Build consensus among water management organizations, such as AGWA, CUWA, and ACWA to support such legislation.

Recommended task group membership:

The Task Group to pursue action concerning this impediment should include persons from the following organizations:

- Association of Ground Water Agencies
- Association of California Water Agencies
- Northern California Water Agency
- Metropolitan Water District of Southern California
- East Bay Municipal Utility District
- California Urban Water Agencies

Comments:

“CALFED should fund a statewide ‘feasibility study’ of specific groundwater use potential projects. \$1 million per year for five years. The purpose will be to work with local distributors to develop specific projects that could be implemented quickly and to provide statewide storage benefits.” - Rich Atwater

“Participation in CALFED was cited during the discussion period as a vehicle for nurturing statewide leadership in conjunctive use. It may also offer opportunities for outside funding. I don’t disagree with this - in fact, it’s a great idea. However, the key players in CALFED may not be receptive to re-tooling of any features given that they are down the road quite a bit and a lot is at stake. I suggest that we simultaneously pursue other major programs as a vehicle for catalyzing conjunctive use leadership. These might include the Salton Sea or the California 4.4 Map plan for the Colorado River.” - Harold Glaser



24

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C-015477

Inability to Address: Quality Differences in “Put” vs. “Take”; Standards for Injection, Export, and Reclaimed Water; and, Unforeseeable Future Groundwater Degradation

WORKING GROUP MEMBERS:

Hansen and Harriger

Impediment description:

Several water quality-related phenomena may adversely affect the successful implementation of conjunctive use.

First, quality of surface water recharged or “put” in a groundwater basin will seldom match the quality of water already in storage. Consequently, extraction or “take” of the stored water when needed will be of quality different than the water previously “put.”

If “take” water is degraded relative to the surface water, conjunctive use may be impeded, and mitigation may be necessary.

Second, increased groundwater storage will raise the water table and thereby cause poorer quality water normally found in the unsaturated zone to become a part of the pumped water. Increased recharged may also change the direction and rate of movement of groundwater contaminants, thereby affecting the quality of water produced. Unless the potential for such effects is addressed, conjunctive use will be constrained.

Third, “poor science” used in establishing water quality standards results in lost opportunities to take full advantage of reclaimed water, export groundwater out of basin, and employ innovative technologies (i.e., injection/recovery).

Importance:

This impediment is important because failure to effectively address potential water quality constraints will limit the extent to which groundwater basins can be used to store surplus surface water.

Suggest an approach to overcoming the impediment:

- Quality of “Put” Water Unequal to “Take” Water

Two possible methods of addressing the issue are to:

- Apply credits or debits to the cost or value of water. The method works well for minerals because the water is useable over a wide range of quality and the economic impact can be quantified either in terms of removal cost or quality-related costs borne by the consumer.
- Remove the troublesome constituent either on the “put” or the “take.” This method is necessary when the constituent renders the pumped water unusable. If the constituent is in the native groundwater, removal and cleanup benefits overlying views and some of the cost may be borne by those who participate in the conjunctive use. Conjunctive use offer the prospect of synergistic benefits with respect to quality for both the agency interested in surface water storage and the overlying views of native water.

- Groundwater Storage May Alter or Aggravate Existing Quality Conditions

Experience has shown that little can be done to prevent the interception of contaminants in the unsaturated zone as the water table rises during filling of the groundwater reservoir. Therefore, the cost of removal or development of the product water to compensate for consumer costs simply becomes a cost associated with the opportunity to store.

Potential for migration of existing contaminants needs to be addressed through modeling. Prediction models will reduce to uncertainty and improve the estimates of costs attributable to the conjunctive use program. More definitive cost will improve the prospect of successful cost allocation between overlying users and those wanting to store surface water.

It is worth noting that storage of water in surface reservoirs often results in changes in quality that are costly to mitigate. Obvious examples are taste and odor, associated with algae, and chemical contaminants, such as perchlorate and MTBE.

- Poorly Established Water Quality Standards

Obvious means to overcome the impediments is to do the science. To accomplish that increased pressure, perhaps political, may need to be brought to bear on regulators such as the Department of Health Services. Their reluctance to finalize standards for storage of reclaimed water delays conjunctive use projects that rely on reclaimed water.

Unforeseeable Groundwater Degradation

Lastly, modeling of groundwater basins will diminish the probability of unforeseen degradation. Perhaps, the only way to address the remaining uncertainty is to agree on an allocation of the risk among all the project beneficiaries.

Recommended task group membership:

- Regional Water Quality Control Boards
- Department of Health Services
- Association of Ground Water Agencies
- Metropolitan Water District
- Department of Water Resources
- CAL and vs. USEPA
- Water Quality Standards Science Experts
- Sanitation Districts





Risk that Water Stored Cannot be Extracted When Needed Because of Infrastructure, Water Quality/Level, Politics, and Institutional/Contractual Provisions

WORKING GROUP MEMBERS:

Haslebacher and Jazmadarian

Impediment description:

A storing entity may not be able to extract stored water during the time of need for several reasons, including:

- Infrastructure - Lack of production and/or conveyance facilities, poor maintenance or poor design of facilities.
- Water quality/level - Groundwater does not meet established water quality standards or groundwater levels in basin are too low to be able to extract water cost effectively.
- Politics - Local political pressure to keep groundwater for overlying uses rather than exporting or not produce all the water and keep in reserves for future use.
- Institutional/contractual provisions - Alternative water supplies supplant need for contractual deliveries or “loop hole” in provision does not allow exercise of program.

Importance:

The storing entity has invested large amounts of capital and water to guarantee production from the basin in order to be reliable and meet 100% of demands. The amount of money invested in conjunctive use has not been justified by the amount of water produced, and it was not a viable conjunctive use program.

Suggest an approach to overcoming the impediment:

- Infrastructure/lack of facilities - Identify existing facilities. Identify type and location of additional facilities needed to extract stored water. Enter into agreements for responsibilities in the construction and maintenance of all facilities. Include periodic testing of facilities.
- Water quality/levels - Identify hydrogeologic constraints to production of contractual water. Establish monitoring programs to monitor changes in basin twice a year or more often, if needed.

Develop analytical tools to predict aquifer responses and water quality trends due to recharge/extraction.

Have a response program to any adverse effects of the conjunctive use program and changes to aquifer characteristics due to overlying use.

- Politics - Establish an operating committee to help override/offset political pressures and settle disputes, and publicize expectations, impacts, and results of conjunctive use programs.
- Institutional/contractual provisions - Establish clear cut guidelines of expectations and performance of both parties including development of operating scenarios/schedules. Include provisions in contract where capital costs and costs of stored water are returned to storing entity in case of nonperformance due to development of alternative water supplies where performance is no longer feasible.

Recommended task group membership:

- Nina Jazmadarian
- Ron Palmer
- Jim Jenks
- Keith Lyon
- Steve Johnson
- John Kennedy
- Anatole Falagan

Lack of Assurances to Address Third Party Impacts and to Increase Willing Local Citizen Participation in Conjunctive Use Projects

WORKING GROUP MEMBERS:

Kelly and Saracino

Impediment description:

Local stakeholders in conjunctive use operations include agricultural, urban, and individual groundwater users; environmental interests; and those interested in maintaining a potential future groundwater source. These stakeholders are concerned that significant, unmitigated impacts may arise from conjunctive operations. Impacts include reduced well yields, subsidence, water quality degradation, increased pumping costs, and loss of water rights. Costs associated with these impacts can be substantial.

Groundwater programs that have been proposed or implemented in northern California over the past seven years have caused the local stakeholders to react very negatively. They feel they have not been included in the development of projects and have sustained financial damages. As a result, many stakeholders have developed fear of and animosity toward proposed conjunctive use projects. These feelings make it very difficult to include local stakeholders in discussions of possible conjunctive use projects and prevent willing participants from getting involved.

Importance:

This impediment literally prevents implementation of conjunctive use projects in northern California. These projects could help meet local and non-local water demands while providing financial benefit to the local project area. Conjunctive use projects in northern California have the potential to greatly increase reliability. Groundwater substitution programs, a form of conjunctive use, provided between 160,000 acre-feet and 260,000 acre-feet in each of the State Drought Water Banks during 1991, 1992, and 1994.

Approach to overcoming the impediment:

CALFED has developed guiding principles designed to help address local concerns and potential impacts prior to implementing a conjunctive use project. These principles could be used as general guidelines for a specific project. They include:

- Providing funding support for local assessment of groundwater resources.
- Conjunctive use programs being done on a voluntary basis only.
- Groundwater being used to meet local water needs first.
- Appropriate compensation for the resource for transfers outside the basin.
- Oversight of conjunctive use projects by local agencies in partnership with other entities to assure that stakeholder concerns are addressed.

A conjunctive use pilot project could be developed incorporating these principles which would demonstrate how the project could satisfactorily address third party impacts. This process would focus on a specific conjunctive use project proposal and involve local stakeholders to identify specific concerns and solutions. The objective of the project would not be to maximize water supply, but to develop mechanisms that assure local stakeholders that third-party impacts will be addressed and mitigated, if necessary.

Task is to develop assurance mechanisms to protect third parties from negative impacts associated with implementation of a specific conjunctive use pilot project.

Task group membership:

Group membership should include representatives of:

- Providing and receiving water districts.
- Local County government.
- Local water-user groups such as the Farm Bureau, citizen advocacy groups, local water associations.
- Local environmental interest group(s).
- CALFED
- DWR
- USBR

Lack of Creativity in Developing Lasting “Win-Win” Conjunctive Use Projects, Agreements, and Programs

WORKING GROUP MEMBERS:

Purkey and Stewart

Impediment description:

Conjunctive use remains an illusive emerging water management strategy. Promising pilot projects suggest, however, that it may become an important part of the California water landscape. Unfortunately the ability to implement successful conjunctive use programs is often impaired by traditionally fragmented approaches to dealing with water rights, water quality, projects costs, project financing, water supply, and environmental protection.

The difficult negotiations between East Bay Municipal Utility District (EBMUD) and parties located in San Joaquin County serve as an example of how traditional problem solving is often ineffective. Although EBMUD is willing to fund a project that would both increase their water supply reliability and help recharge a severely overdrafted groundwater basin, the negotiations failed. This failure demonstrates the types of impediments which traditional thinking can engender.

EBMUD likely viewed this project as a simple engineering effort to increase available water supply and initially failed to recognize the difficult, unresolved water rights implications of storage and recovery in San Joaquin County.

The parties in San Joaquin County, bound by fears of losing control of important local water rights, were willing to pass on an opportunity to restore groundwater levels in their basin.

Failures related to adherence to traditional positions of this type are not unique and in fact contribute in large measure to the other stated impediments to conjunctive use. Although each project has unique elements, a framework that spawns creative thinking about conjunctive use will increase the likelihood that mutually beneficial projects will be implemented.

Importance:

The failure to move beyond traditional thinking to realize conjunctive use projects represents missed opportunities. When significant resources are invested in failed negotiations, real costs are incurred. The repeated failures discourage potential beneficiaries from pursuing additional conjunctive use opportunities. This is very unfortunate as enormous and multiple benefits can be derived from the successful implementation of conjunctive use programs. Writing about the role of conjunctive use in groundwater management, David Keith Todd and Iris Priestaf¹ wrote that:

Increasingly conjunctive use strategies are not only comprehensive, combining groundwater with local, imported, and recycled surface water systems, but also integrated. An integrated management system takes into account not only water supply objectives, but also related goals such as water quality management or maintenance of streamflow and riparian habitats.

Additionally, the cost of not developing this resource is immeasurable and becomes larger as the need for and value of water increases. The incentive for creative conjunctive use projects that integrate the need of various stakeholders exists on a variety of levels. In the Chino Basin of southern California, an adjudicated basin, the stakeholders are developing an optimum basin management program in response to a recent court ruling. Desire to comply with the ruling, which created a “crisis” situation and timeline, requires success to preserve the adjudication. The stakeholders have very diverse needs and interests, and the optimum basin management program must creatively and constructively balance these in order to be implementable. The stakeholders are committed to a successful outcome and have already begun an intense process to develop these creative solutions.

On a statewide level, maximal integration of surface water and groundwater could provide substantial yield that could be applied to increasing water supply reliability in California and to restoring damaged aquatic ecosystems. Early analysis conducted by the Natural Heritage Institute concluded that an annual average yield of approximately one-million-acre-feet could be generated through re-operation of surface water reservoirs in the Central Valley. This yield would be created through pre-delivery of surface water during the summer months, which would free up reservoir capacity to capture additional winter flows. By “enlarging” our surface reservoirs, additional flexibility would be created to realize integrated and multiple objectives.

¹ Todd, David Keith and I. Priestaf. 1997. Role of Conjunctive use in Groundwater Management. In Conductive Use of Water Resources: Aquifer Storage and Recovery. 1997 AWRA Symposium. Long Beach, CA

Suggest an approach to overcoming the impediment:

Initially, there must be a shared recognition of the need for conjunctive use programs. The path toward this shared recognition may differ among the various parties or stakeholders.

Depending on the path they have followed, stakeholders come to negotiations regarding potential conjunctive use projects with diverse objectives. The next crucial step in creative thinking is the clear articulation of the needs and objectives of each party.

Once the needs or interests of each of the parties are identified, some of the newer methods of building consensus, "thinking out of the box" or "getting to yes" must be utilized to develop creative conjunctive use programs. These methods rely on accepting the needs and interests of others as legitimate points in the ultimate solution space and a desire to accommodate these points to the maximum extent possible.

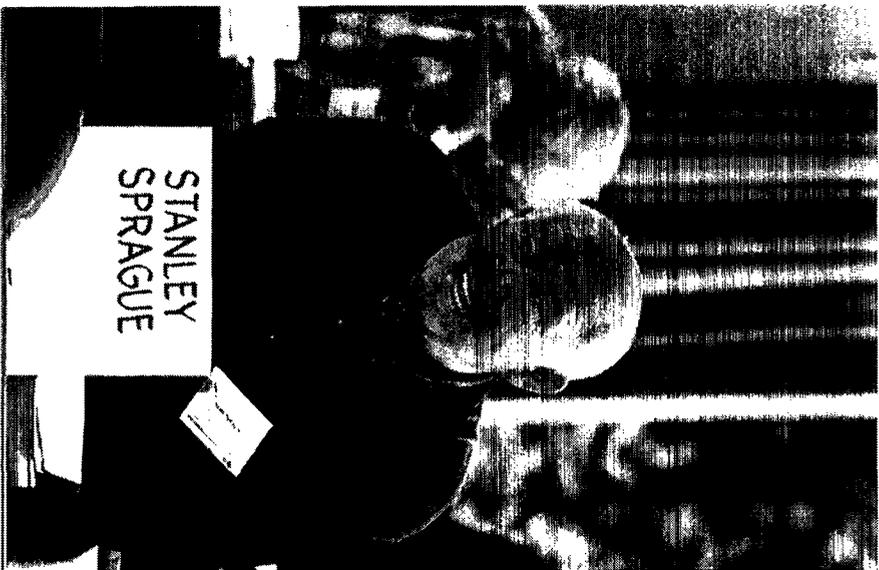
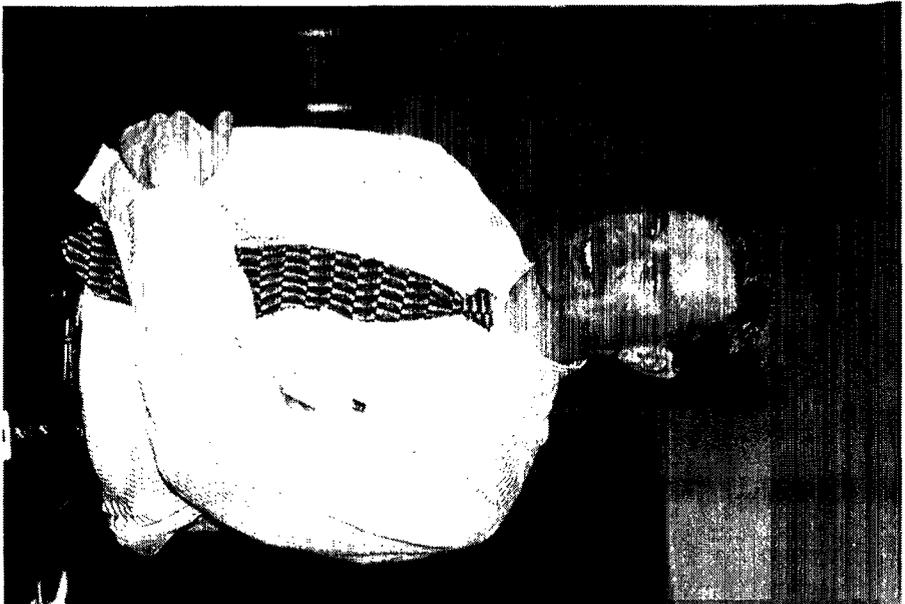
Because the legitimacy of these points is not in question, a new set of tools may be required in the "tool box" to screen the array of potential solutions and to evaluate the benefits of proposed solutions to each stated need and interest. The emerging family of rapid assessment tools can be particularly useful at this point.

In solving any complex problem, commitment to finding a mutually beneficial solution is crucial. Parties should work to develop small successes to build trust and demonstrate mutual benefits.

Recommended task group membership:

The Task Group to pursue action concerning this impediment should include persons from the following organizations:

- Association of Ground Water Agencies
- Association of California Water Agencies
- Northern California Water Agency
- Metropolitan Water District of Southern California
- East Bay Municipal Utility District
- California Urban Water Agencies



36

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Supplemental Suppliers and Basin Managers Have Different Roles and Expectations in Relation to Conjunctive Use

WORKING GROUP MEMBERS:

Erb, Means, and Sprague

Impediment description:

When the supplemental supplier considers conjunctive use, they are looking at it mainly from an importer's perspective. Groundwater managers must manage supplies with varying availability to meet retail needs.

Local supplies are generally available at the same time as excess imported supplies. Limited spreading capacity forces the basin manager to make difficult risk-balancing decisions. For example, a basin manager could leave a portion of the basin available to store potential future local supplies, or fill the basin with imported supplies and gamble that there will be no further local runoff. The cost implications of such a decision could involve millions of dollars.

The supplemental supplier generally expects that discounted conjunctive use deliveries will return a commensurate and measurable regional benefit. There is agreement on the point that regional dollars should garner regional benefits; however, there is not always agreement on the optimum way of measuring the production of the "called" water during a need. The supplemental supplier has pressure to establish generic evaluation criteria to judge individual basin attributes and value when the basins are institutionally, hydrologically, and physically unique. One size does not fit all.

Importance:

The current situation frustrates both supplemental suppliers and basin managers and confounds expanded conjunctive use opportunities. Agreement on optimum measurement methods for called water will demonstrate to the financial contributors the regional value of the program.

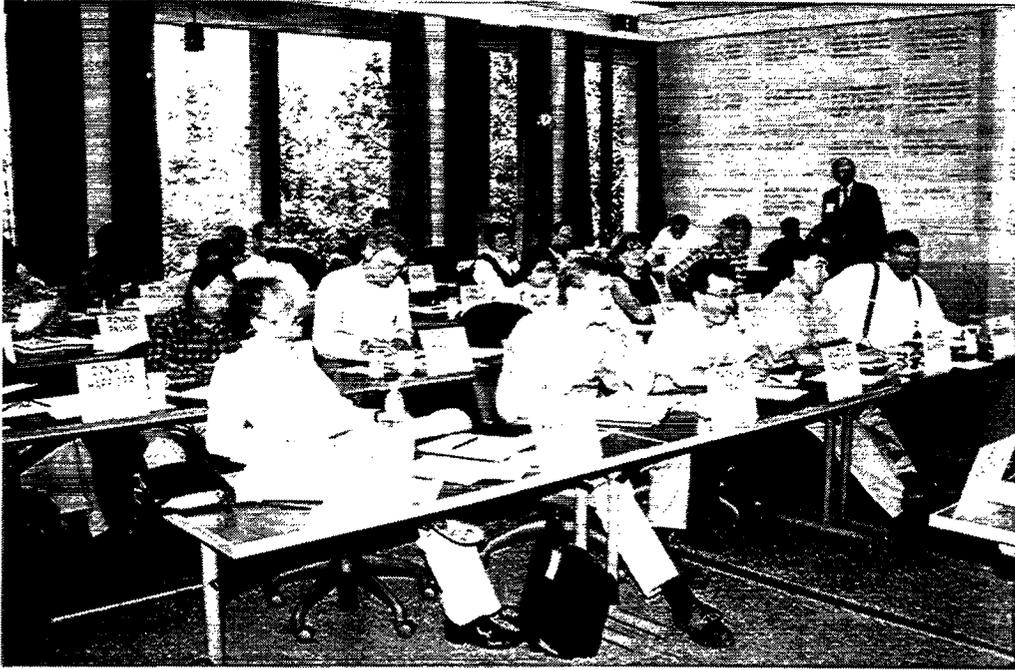
Suggest an approach to overcoming the impediment:

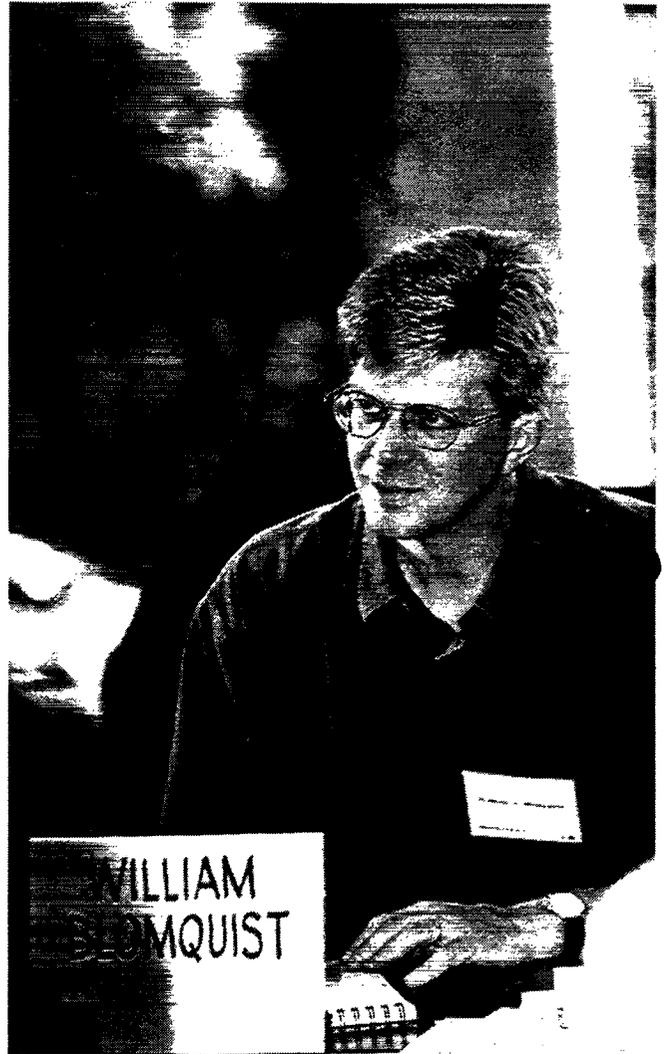
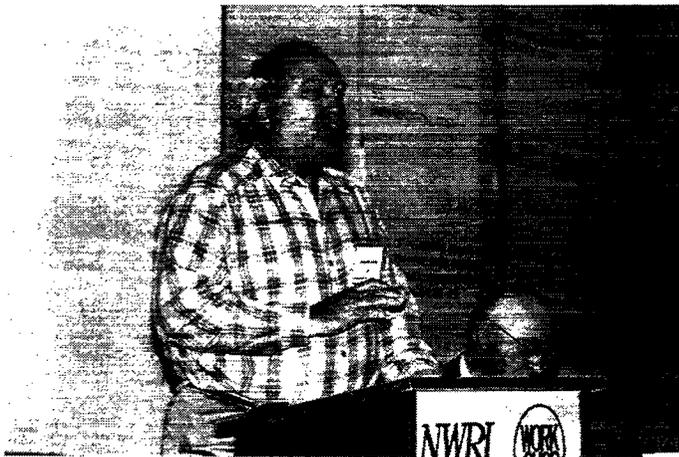
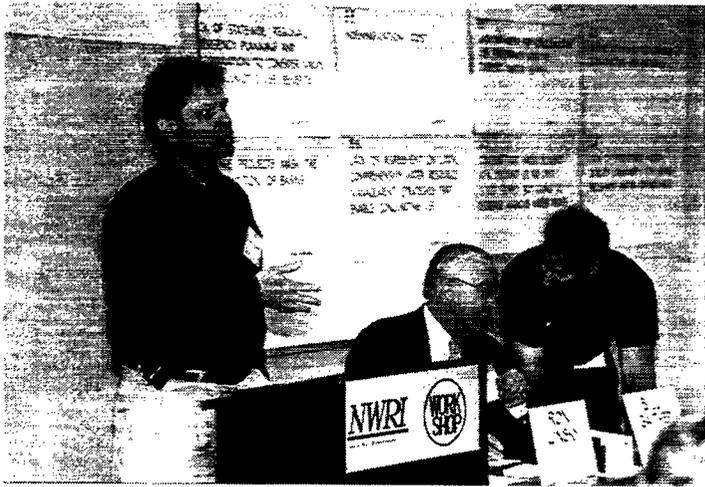
- Establish the target dry-year deliverable desired. Issue a Request for Proposals to the basin managers to meet this need, including methods for clearly measuring production. Establish a review group including non-basin financial stakeholders to screen and short-list proposals for selection by the decision maker(s).
- Evaluate programs to avoid the competition between management of local supplies and supplemental supplies, including adding additional spreading capability or maximizing the use of existing spreading facilities.

Recommended task group membership:

- William Mills, General Manager, Orange County Water District
- Ron Palmer, General Manager, Foothill Municipal Water District
- Brian Thomas, Asst. Chief of Planning and Resources, MWDSC
- Don Harriger, General Manager, Western Municipal Water District
- Nina Jazmadarian, Senior Resource Specialist, MWDSC
- Dennis Underwood, Consultant
- Neil Cline, Consultant, Santa Barbara
- Bob Yamada, SDCWA
- Scott Munson, LADWP
- Paul Jones, Central/West Basin
- Kathleen Kelly, DWR
- Thomas Haslebacher, KCWA
- Ed Stefani, Stockton East
- David Orth, Westlands

- Chris Helm, Promms
- Brent Graham, Tulare Lake
- Dennis Diemer, EBMUD





PART 2

NGT Workshop



INTRODUCTION

The Nominal Group Technique (NGT) was developed by Professors Delbecq and Van de Ven in the late 1960s at the University of Wisconsin. Their goal was to design a process that would allow a group of individuals to meet and quickly come to consensus, without the usual delays that result from each taking time to establish his or her own credentials in the eyes of the group, or the dominance of the meeting by a particularly vocal individual or individuals. The technique also allows a group of individuals to address efficiently a question that could not be resolved satisfactorily by a single individual. This technique has been improved and refined by Dr. William S. Gaither who facilitated this workshop for the NWRI.

Experts identified by NWRI and its workshop co-sponsors were invited by the NWRI to participate (See Appendix B).

In this workshop, the NGT process was used to assist the twenty-five participants respond to the question: *What are the most significant impediments to implementing a cost-effective conjunctive use water management program in California?* On the evening of the first day (May 27) workshop guidelines and procedures were reviewed. The second day (May 28) was the NGT workshop comprising three distinct steps:

- Impediment identification.
- Consolidation of impediments into major impediment groups, minimizing overlap between groups.
- Individual ranking of the ten highest priority impediments.

Participants identified 89 impediments and presented them to the participants. Titles of these impediments were posted on the walls of the workroom. That afternoon and evening, participants were guided through a systematic discussion to boil these 89 individual barriers down to twenty-six major impediment groups. At the conclusion of the consolidation process, each participant completed a Priority Ranking Form, indicating his or her top ten impediments. Impediment write-up texts that appear in this report were edited and approved by each author.



STEVE
BACHMAN



EDWIN
JAMES



WILLIAM
MILLS

PRIORITY 1

Inability of Local and Regional Water Governance Entities to Build Trust, Resolve Differences (Internally and Externally), and Share Control

ORIGINATORS:

Glaser on behalf of himself, Hansen, Harriger, James, Means, Mills, Palmer, Sprague, Won/Bachman, and Young

The following impediments were subsumed under the above title:

***Impediment title:* Inability of Local Groundwater Management Governance Structures to Overcome Internal Objections**

Originator: Glaser

Impediment description:

Current groundwater management governance bodies (e.g., special districts, watermasters) appear to have difficulty in moving forward with groundwater storage agreements if only one party objects.

Importance:

One dissenting party can effectively block an agreement or program despite the will of a majority of participants. Witness that most successful programs have relatively small (in some cases only two) parties to the agreement.

How to overcome the impediment:

This is a tough one. It requires education of the benefits of conjunctive use to decision makers (e.g., engineers, managers, operations, legal staff as well as elected/appointed officials).

Impediment title: **Lack of Trust and Understanding**

Originator: Hansen

Impediment description:

The major stakeholders do not trust one another to fairly and equitably protect and persevere each other's rights.

Importance:

Without trust, there will be no implementing or operating agreement. It is the most fundamental element needed for a conjunctive use agreement.

How to overcome the impediment:

Develop small, simple projects and provide a positive safe operating experience over an acceptable period of time.

Impediment Title: **Total Commitment of All Stakeholders "From the Bottom Up"**

Originator: Hansen

Impediment description:

Local groundwater right holders (retailers) overlying the basin are not involved in the initiation and structuring of programs.

Importance:

Local agencies feel left out and subsequently will not support the program.

How to overcome the impediment:

Start development of program from the lowest level.

Impediment title: **Loss of Ownership (Water Right)**

Originator: Hansen

Impediment description:

Stored water (owned by newcomer) takes up space that could be filled with natural (zero dollars) replenishment water to the benefit of the existing basin water rights holder.

Importance:

Existing basin water rights holder may not want to risk losing free water or having to buy expensive water.

How to overcome the impediment:

Benefactors need to be clearly identified and benefits quantified with benefits and risks equally matched up.

Impediment title: **Unwillingness of Overlying Groundwater Purveyors to Share the Groundwater Basin with Surface Water Suppliers at a Price That is Net of Local Benefit**

Originator: Harriger

Impediment description:

Surface water agencies argue with groundwater users over what the cost of storage should be.

Importance:

Failure to agree on cost allocation results in reduced conjunctive use and diminished overall water resource benefits.

How to overcome the impediment:

Internalize cost and benefit with super agency.

Impediment title: **Concerns That Once Metropolitan Can Extract Water Out of the Basin What Will Stop Them Taking Control of the Basin**

Originator: James

Impediment description:

If MWD puts water into a basin, then MWD wants control over the water they have stored and guarantees that they can use the water when they need it. Groundwater agencies want to lease the storage but not give up control of the basin.

Importance:

Groundwater agencies are concerned that if MWD is allowed to enter the basin as an equal partner then MWD may try to take control of the basin in the future.

How to overcome the impediment:

- Limit the amount of water that can be exported from the basin.
- Allow MWD to extract water by agreement but not under the same rights as the local producers.

Impediment title: **Lack of Wholesale Agencies' Understanding of the Retail Needs**

Originator: James

Impediment description:

Wholesale agencies look at regional issues that sometimes do not meet the retail agencies' needs.

Importance:

Wholesale agencies tend to focus on regional programs that may not always meet the needs of the retail agencies.

How to overcome the impediment:

Regularly meet with the retail agencies to keep them informed on the program and ask for their input.

Impediment title: Unwillingness of Basin Interests/Regional Interests to Cede Significant Control

Originator: Means

Impediment description:

Regional financial commitment requires regional benefit (verifiable performance). "Profit" motive creeps into negotiations creating inter-regional winners and losers.

Importance:

Confounds win/win outcome. Pits "haves" against "have-nots," community against community, and raises social costs of essential resources.

How to overcome the impediment:

- Adopt cost-based approach - no "profit."
- No local harm.
- Include improved local reliability.
- Contractual performance commitments.
- Establish single authority in each basin - currently too complex.
- Make basin's public resources to broaden public investment appeal of conjunctive use.

Impediment title: **Balkanized State of Groundwater Basins Management**

Originator: Means

Impediment description:

Each basin is very different in its legal/political structure.

Importance:

- Myriad hurdles to cross.
- Political minefield.
- Fear of MWD.

How to overcome the impediment:

Theoretical exercise by think tank to erase geopolitical boundaries statewide to develop new management strategy (i.e., start over).

Impediment title: **Perceived Loss of Local Control of Basin Management to Importing Agency (MWD)**

Originator: Mills

Impediment description:

Within the MWD service area there is a perception that MWD wants control of the conjunctive use program facilities (e.g., own and operate facilities) and have title to stored water.

Importance:

Local groundwater management agencies want and need operational control of the conjunctive use program due to their basin management responsibilities.

How to overcome the impediment:

Let local agencies have control of storage program. Operate according to contractual performance criteria. MWD could choose between competing conjunctive use proposals from local basin management agencies.

Impediment title: Basin Managers' Power/Ability to Retain Control of Basin Management and Operation

Originator: Palmer

Impediment description:

Within Metropolitan Water District's (MWD) service area, groundwater basins are very well managed and protected from outside political influence. MWD's presence in the basins is perceived by basin managers as a possible threat to retaining full management and operational control. Basins have made substantial investments to assure water availability under all conditions - there is a hesitancy to commit to programs that may jeopardize their investment and control.

Importance:

This impediment is very significant as it has been a factor in unsuccessful negotiations that have occurred to date between MWD and several groundwater basin managers.

How to overcome the impediment:

Regional partnerships?

Impediment title: Lack of Trust that "A Deal is a Deal"

Originator: Sprague

Impediment description:

- Rate structure changes
- New storage programs

- Unclear vision of regional benefits
- Lack of drought management program

Importance:

No one knows what they will receive during the wet or dry years.

How to overcome the impediment:

Have a flexible drought plan and wet year plan that ties rates and

Impediment title: **Lack of Interagency Cooperation Within a Basin or Watershed**

Originator: Won/Bachman

Impediment description:

Lack of understanding and/or cooperation among agencies in basin/watershed. For example, one agency has groundwater storage available but does not coordinate with nearby imported water users. Therefore, both agencies miss an opportunity for conjunctive use. This most likely occurs when one agency uses groundwater primarily and the other agency uses imported sources.

Importance:

Missed opportunities - looking afar instead of looking for local solutions. By not using local solutions, the importing agency may use resources/conveyance elsewhere at higher cost and problems.

How to overcome the impediment:

Agencies should first look for local conjunctive use opportunities. Develop a regional plan for conjunctive use. This plan may involve agencies that do not usually work together, so local leadership is required.

Impediment title: Lack of Defining of Local Storage vs. Regional Storage

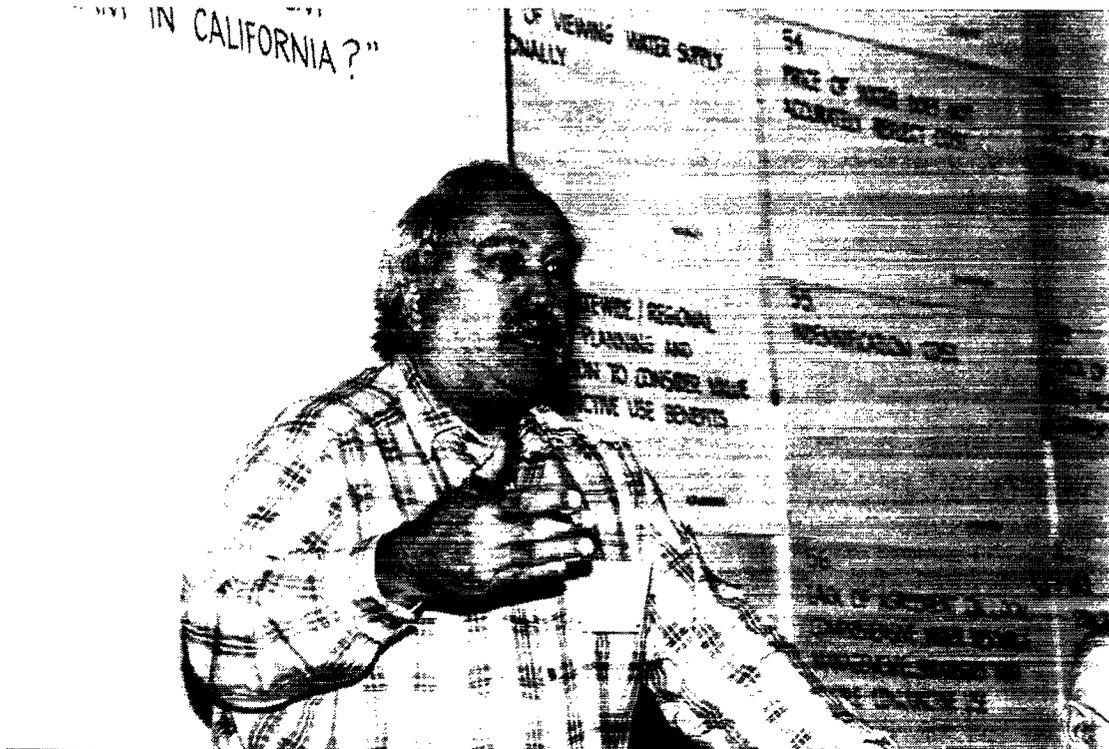
Originator: Young

Impediment description:

- Some basins have been mined extensively leaving the basin low.
- Water under a conjunctive use label is simply used to refill basins, thus only protecting overlying users.

Importance:

Programs that are paid for regionally should offer some value to the agencies paying for conjunctive use.





PRIORITY 2

Inability to Match Benefits and Funding Burdens in Ways That Are Acceptable to All Parties, Including Third Parties

ORIGINATORS:

Thomas on behalf of himself, Harriger, Hauge, James, Won, and Yamada

The following impediments were subsumed under the above title:

Impediment title: **Inability of Single Purpose Groundwater Storage Projects to Compete With Multipurpose Surface Reservoirs**

Originator: Harriger

Impediment description:

Proponents of surface water storage attract public support through project amenities like recreation. Public support leads to project approval and financial resources. Surface water projects win popularity contests.

Importance:

If public support for water projects and financial resources are consumed by surface storage projects, groundwater storage and conjunctive use will not occur.

How to overcome the impediment:

Make groundwater storage and conjunctive use multipurpose. Include water quality cleanup as a project benefit. Require surface water storage proponents to share resources.

Impediment title: **Unwillingness of Surface Water Purveyors to Pay a Fair Price for Groundwater Storage**

Originator: Harriger

Impediment description:

Surface and groundwater agencies cannot agree on cost and benefit allocation.

Importance:

Effectiveness of both groundwater and surface water systems is less than it would be if used conjunctively.

How to overcome the impediment:

Internalize costs and benefits.

Impediment title: **Unwillingness of Overlying Groundwater Purveyors to Share the Groundwater Basin with Surface Water Suppliers at a Price That is Net of Local Benefit**

Originator: Harriger

Impediment description:

Surface water agencies argue with groundwater users over what the cost of storage should be.

Importance:

Failure to agree on cost allocation results in reduced conjunctive use and diminished overall water resource benefits.

How to overcome the impediment:

Internalize cost and benefit with super agency.

Impediment title: **Lack of Reaching Agreement on the Fiscal Responsibilities of Each of the Parties, Including Buyers, Sellers, and Third Parties**

Originator: Hauge

Impediment description:

- Education of all parties.
- Adequacy of technical data to ensure technical understanding of the hydrogeology.
- Understanding the political, institutional, and legal constraints.
- Inclusion of all affected parties in the process.
- Payment for monitoring groundwater quantity and quality.

Importance:

Conjunctive use can not be achieved if agreement is not possible. Quantification of cost of the water supplies and storage facilities can be accomplished, and the cost of meeting or not meeting water quality objectives can be established.

How to overcome the impediment:

Plan and fund a program that adequately addresses the issues referred in the above impediment description.

Impediment title: **The Lack of Establishing the Economic Value of Storing Water in a Conjunctive Use Program**

Originator: James

Impediment description:

Agencies that overlie a basin have a strong belief that storage in their basin has a tremendous value. Agencies that do not overlie basins believe spending money to enhance water supply on groundwater basin is a give-away program.

Importance:

Groundwater agencies have several needs (e.g., increase water supply, water quality problems), and a conjunctive use project is a potential source of funds that could be utilized to help meet these needs. Agencies that do not have groundwater basins do not want to spend money that may enhance water supply for another agency.

How to overcome the impediment:

Agencies that have groundwater basins and agencies that do not have groundwater basins need to agree on the value of storing water in a groundwater basin.

Impediment title: **Inability to Match Benefits and Funding Burdens in Ways That Are Acceptable to All Parties**

Originator: Thomas

Impediment description:

Agencies that manage and/or pump from groundwater basins do not perceive that they have access to sufficient funding to justify the expansion of facilities and changes in institutional structures to provide assurance to MWD that groundwater capacity and stored water will be used during times of shortage for the benefit of all MWD's service territory.

MWD's import-dependent member agencies do not perceive that the benefits of storing water in groundwater basins justifies additional funding or financial incentives, without assurances that this stored water will be used during times of shortage for the benefit of all member agencies.

Importance:

Without clear description of beneficiaries and cost burdens, funds will not be made available to expand pumping capacity and add needed facilities to implement conjunctive use programs that increase yield of imported and local supplies.

How to overcome the impediment:

A combination of actions will be required to overcome this mismatch between funding expectations and funding sources.

First, use of statewide funds (e.g., CALFED) will help both basin agencies and MWD close the gap in funding needs.

Second, commitments by both MWD and the basin agencies to specified deliveries and withdrawal schedules will provide for better planning and assurances.

Third, contractual arrangements providing financial security in exchange for performance targets will provide operating flexibility for all parties, while ensuring cooperative use of the imported and groundwater systems.

Impediment title: **Inability to Understand the Other Parties' Risks and Benefits**

Originator: Won

Impediment description:

Each party sees more benefit being provided to the other party than to himself and sees himself taking on more risk than before. Each party thinks he should be compensated for the other's benefits.

Importance:

The inability to reach agreement on the risks and benefits of a program would preclude reaching an agreement for conjunctive use. Each party would not place the same value on storage.

How to overcome the impediment:

A more thorough understanding of each other's risks and benefits and need for conjunctive use. Another possible solution is to legislate action.

Impediment title: Lack of an Updated, Quantifiable Regional Cost/Benefit Analysis and Comparison With Other Resource Alternatives, Such as Option Transfers

Originator: Yamada

Impediment description:

This impediment includes the following issues:

- The need for a quantifiable determination of the regional costs and benefits of conjunctive use.
- The need for an updated evaluation of the regional economics of conjunctive use in the context of other resource alternatives, such as option transfers.

Importance:

Until this impediment is removed, consensus-based development of regionally-beneficial and cost-effective conjunctive use programs will not occur.

How to overcome the impediment:

Conduct analysis and comparison studies before any new conjunctive use program is developed or modified.

Lack of Sufficient Federal, State, and Regional Financial Incentives to Encourage Groundwater Conjunctive Use to Meet Statewide Water Needs

ORIGINATORS:

Atwater on behalf of himself, Glaser, Grindstaff, and Won

The following impediments were subsumed under the above title:

Impediment title: Lack of Consistent State and Regional Financial Incentives

Originator: Atwater

Impediment description:

Conjunctive use water management provides significant statewide storage benefits. The State of California (e.g., DWR, SWRCB, CALFED) has provided insignificant financial resources and inconsistent institutional leadership on implementing conjunctive use management.

Importance:

Conjunctive use management is critical to success of the CALFED Bay-Delta Program and meeting the water supply needs statewide during the next 20-30 years.

How to overcome the impediment:

CALFED, DWR, and SWRCB (and future governors) should support water bond measures and policies to encourage local conjunctive use management programs that provide both regional and statewide water supply benefits.

Impediment title: **Financial Benefits of Conjunctive Use Are Insufficient to Overcome Perceived Risks**

Originator: Glaser

Impediment description:

Simply put, MWD is not offering enough reward in return for the risk of entering into storage contracts. There is an insufficient driving force.

Importance:

In the words of our controller: Cash is king - always has been - always will be. MWD may not be offering enough for groundwater basin managers to move forward with negotiations.

How to overcome the impediment:

Consider re-evaluation of the value of stored groundwater to MWD. Willingness to sell could be re-evaluated by groundwater basin managers/pumpers.

Impediment title: **Lack of Understanding the Economic Value of Conjunctive Use**

Originator: Grindstaff

Impediment description:

Conflicting interests and lack of understanding by groundwater and non-groundwater agencies about the value of storage has led to an unwillingness to fund local agency programs. A related problem is the greed of some agencies.

Importance:

A lack of understanding will lead to a lack of commitment to do anything.

How to overcome the impediment:

Somehow, creating conjunctive use programs must either be required as a part of other desired processes such as CALFED and the Colorado River 4.4 Plan, or a market place needs to be developed where storage would be sold or leased in an open market.

Impediment title: **Lack of Funds/Financial Incentives**

Originator: Won

Impediment description:

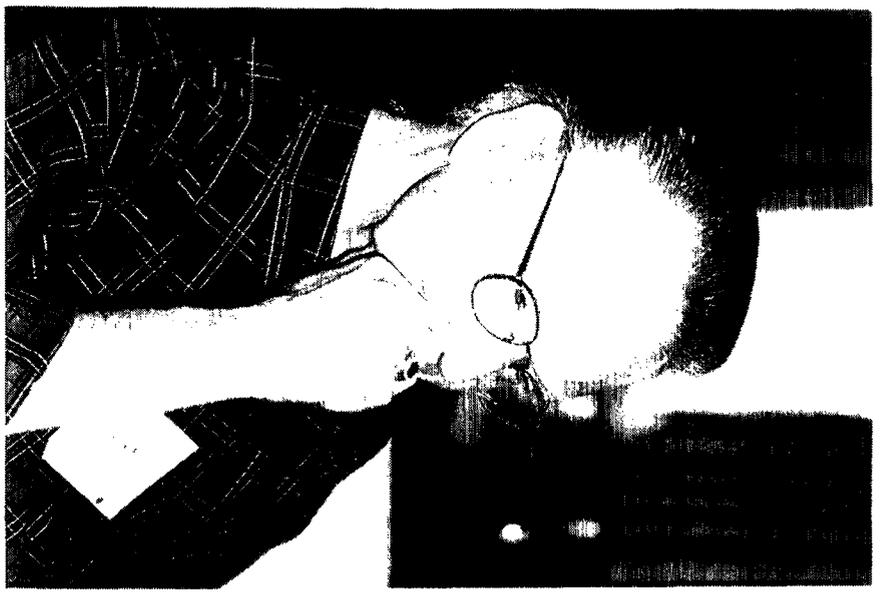
There is a lack of funds to implement a conjunctive use program. Funds are not available to build additional facilities or to buy additional water required for such a program. Agencies have no incentive to take risks to develop the program.

Importance:

All conjunctive use programs require an investment in facilities and/or water and thus require capital. Agencies need funds or incentives for pay back of expenditures.

How to overcome the impediment:

Grants, low interest loans, deferred payment for water.



Legal Constraints Impede Conjunctive Use Regarding: Storage Rights, Basin Judgments, Area of Origin, Water Rights, and Indemnification

ORIGINATORS:

Miller on behalf of himself, Hansen, Mills, Palmer, and Saracino

The following impediments were subsumed under the above title:

Impediment title: **Indemnification Cost**

Originator: Hansen

Impediment description:

Future unknown indemnification costs could be millions and millions of dollars, which could result in the project becoming economically infeasible.

Importance:

The fear of huge financial costs may prevent the project from being developed.

How to overcome the impediment:

Honest realistic analysis of risk/benefit to each party.

Impediment title: **Legal Constraints**

Originator: Miller

Impediment description:

Water rights for banking, pumping, and conjunctive use are or can be complicated. Conjunctive use in adjudicated basins is particularly constrained.

Importance:

Legal constraints can be a fatal flaw even if cooperative agencies conceptually agree.

How to overcome the impediment:

Stakeholders must agree to needed legal changes and implement a strategy to overcome legal issues.

Impediment title: **Local Water Storage Rights Impede Conjunctive Use**

Originator: Mills

Impediment description:

State law is viewed as providing that groundwater storage rights are property rights belonging to the overlying landowners.

Importance:

Prevents importation agencies from using available groundwater storage unless there is complete agreement by local agencies and local landowners. Possible legal battle.

How to overcome the impediment:

Statewide or regional planning coordinated with local groundwater agency outreach program to identify local benefits as well as defining local incentives; possible formation of AB 3030 groundwater management agencies in areas where no management agency exists.

Impediment title: **Variations in Provisions/Restrictions of Basin Judgments or Governance Regulations**

Originator: Palmer

Impediment description:

The MWD has been trying to establish a set of conjunctive use principles applicable to their programs. Because basin governance varies considerably, including export rights, water quality parameters, indemnification authority, etc., a “one-size fits all” set of principles is virtually impossible.

Importance:

Without flexibility of principles, the diversity of groundwater basin governance will impair development of conjunctive use agreements.

How to overcome the impediment:

Conjunctive use principles must be flexible/adaptable to various basin

Impediment title: **Inability to Sufficiently Address Area-Of-Origin and Water Rights Concerns of the Stakeholders**

Originator: Saracino

Impediment description:

Local pumpers within and adjacent to conjunctive use areas are concerned that agency implementation of conjunctive use programs will result in the loss of their water rights.

Importance:

If local pumpers or their interest groups are not convinced that their water rights are protected, they can delay or prevent the implementation of conjunctive use programs by challenging permits issued through county ordinances or by initiating litigation.

How to overcome the impediment:

- Identify stakeholders during project development.
- Identify stakeholder concerns.
- Develop contractual language to address water rights concerns between implementing agency and landowners.
- Execute mutually developed contracts.
- Craft legislation.



Lack of Statewide Leadership in the Planning and Development of Conjunctive Use Programs as Part of Comprehensive Resource Planning, and Recognizing Regional and Stakeholders' Interests

ORIGINATORS:

Mills on behalf of himself, Atwater, Harriger, Hauge, Miller, and Young

The following impediments were subsumed under the above title:

Impediment title: Lack of Statewide Drought Management Policy

Originator: Atwater

Impediment description:

State/regional drought policies should be clearly articulated. Suggestion - water utilities overlying groundwater basins should rely (to the maximum extent practical and financially feasible) on local groundwater supplies and minimize.

Importance:

Governor's water bank and overall drought management drought 1989 - 1992 generally successful. Simple performance criteria needed.

How to overcome the impediment:

Establish a statewide drought policy.

Impediment title: **Lack of Statewide/Regional Emergency Planning and Coordination to Consider Value of Conjunctive Use Benefits**

Originator: Atwater

Impediment description:

Emergency storage reserves are clearly an important need.

Importance:

Besides drought, other emergencies (e.g., outages/interruptions of imported supply) highlight the need for local supplies (e.g., wells).

How to overcome the impediment:

Urban water management/integrated resources planning should develop emergency contingency plans.

Impediment title: **Lack of Agreement on Local Comprehensive Water Resource Management Strategies That Enable Conjunctive Use**

Originator: Harriger

Impediment description:

A plan would address many of the uncertainties and thereby reduce risk of failure among participants in conjunctive use.

Importance:

Plan would help address equity issues. Surface and groundwater use would be coordinated.

How to overcome the impediment:

Engage all entities that affect water management in building consensus on a resource management plan.

Impediment title: **Lack of Effective Leadership That Builds Consensus to Accomplish Goals**

Originator: Hauge

Impediment description:

Multi-agency control of pieces of the puzzle. Local agencies wait for the state to provide leadership. State agencies wait for local leadership.

Importance:

Who is in charge here? Where are we going?

How to overcome the impediment:

- Statewide management.
- Consolidation of local agencies to provide one "leader."
- Coordination and cooperation to provide effective leadership.

Impediment title: **Lack of Recognition of the Components of Successful Conjunctive Use Programs**

Originator: Hauge

Impediment description:

- Programs were developed from the bottom up, including local landowners.
- Present proposals are coming from the top down.

Importance:

Negatively affects present proposals.

How to overcome the impediment:

- Analyze the method of development of conjunctive use programs.
 - Involve all the parties.
-

Impediment title: **Lack of Regional Planning Between Stakeholders**

Originator: Miller

Impediment description:

Lack of regional planning causes selfish, narrow-minded parochial behavior.

Importance:

This type of behavior produces protective and defensive agency policies.

How to overcome the impediment:

Institute regional planning among stakeholders resulting in unified goals and desired actions to expand or achieve conjunctive use.

Impediment title: **Lack of Coordinated Statewide Conjunctive Use Planning**

Originator: Mills

Impediment description:

Importation agencies, usually federal, state or regional, do not have common interests with local groundwater agencies.

Importance:

Only through coordinated studies by an agency such as DWR, with statewide interests, can the divergent interest be brought together for the common good.

How to overcome the impediment:

DWR must be directed or mandated to develop statewide conjunctive use management studies, programs by the administration, or the legislature. The programs should be developed cooperatively with local groundwater agencies.

Impediment title: **Lack of Viewing Water Supply Regionally**

Originator: Young

Impediment description:

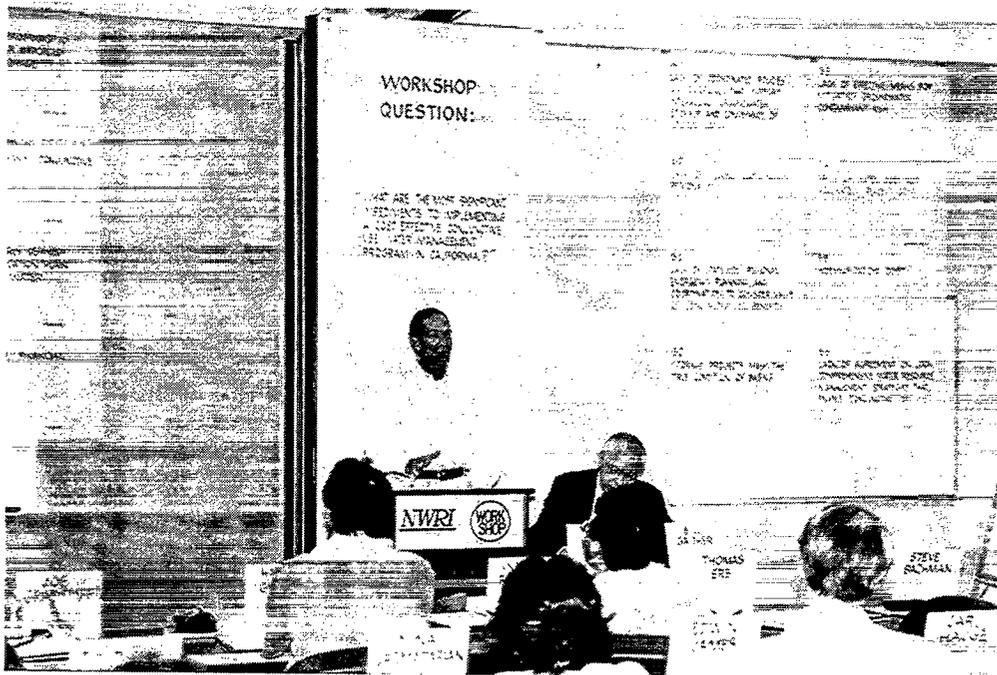
Individual water users (agencies) see basin resources as their own, yet coordinated use of resources could increase overall yield.

Importance:

Opportunity to store water is lost.

How to overcome the impediment:

- Coordinate water resources regionally.
- Coordinate water resources basin by basin.



PRIORITY 6

Inability to Address: Quality Differences in “Put” vs. “Take”; Standards for Injection, Export, and Reclaimed Water; and Unforeseeable Future Groundwater Degradation

ORIGINATORS:

Harriger on behalf of himself, Falagan, Glaser, Hansen, Miller, and Palmer

The following impediments were subsumed under the above title:

Impediment title: **Inability to Export Produced Water Outside a Basin Due to its Quality**

Originator: Falagan

Impediment description:

Quality of production water from a program is important in inverse proportion to the demands a basin entity meets.

Importance:

The more production water that must be exported, the more that water's quality will come into question by the receiving users.

How to overcome the impediment:

Don't know yet.

Impediment title: **Lack of Effective Means for Mitigating Groundwater Contaminant Risk**

Originator: Glaser

Impediment description:

MWD and groundwater basin managers are concerned with conjunctive use activities that result in their being named a potentially responsible party under the Comprehensive Environmental Responsibility, Cleanup, and Liability Act (CERCLA) (a.k.a. Superfund) or other legislation due to contaminant migration.

Importance:

This is a significant deal breaker and is ironic because neither party caused the contamination in the first place. Mitigation via wellhead treatment is costly.

How to overcome the impediment:

- Invest in conservative wellhead treatment facilities that protect consumers.
- Consider advocating amendments to federal CERCLA or Superfund Amendment and Reauthorization Act (SARA) legislation to protect groundwater managers and imported water suppliers.

Impediment title: **Lack of “Good Science” in Establishing Water Quality Standards for Injection/Recovery Projects**

Originator: Hansen

Impediment description:

- Limited use of reclaimed water.
- No use of surface import water.

Importance:

Lost opportunity.

How to overcome the impediment:

Research and demonstration with regulatory bodies and acceptable water quality standards.

Impediment title: **Inability to Equitably Address Differences Between the Quality of "Put" Water and "Take" Water**

Originator: Harriger

Impediment description:

Often the quality of surface water to be stored is either better or worse than the groundwater.

Importance:

Conjunctive use does not occur because the issues remain unresolved.

How to overcome the impediment:

Assess credits or debits to cost or value of water based on water quality.

Impediment title: **Lack of Predictable Water Quality Standards for Using Reclaimed Water for Recharge**

Originator: Miller

Impediment description:

Viability and economics of reclaimed water recharge projects are unpredictable due to water quality standards for spreading or injecting reclaimed water not being established.

Importance:

The location of new wells or relocation of existing wells, as well as wellhead treatment, is the outcome of the pending Department of Health Services (DHS) regulations.

How to overcome the impediment:

Apply political pressure to the regional water quality control boards and the DHS to finalize DHS standards for using reclaimed water for groundwater recharge.

Impediment title: **Determination of Responsibility for Unforeseeable Water Quality Degradation - Long Term**

Originator: Palmer

Impediment description:

Substantial increases in basin storage can result in previously unsaturated zones, causing new water quality problems. This rise in levels can also cause changes in movement of contamination plumes. In addition, technology may allow detection of additional contaminants. Because programs are generally designed for 25-50 years, assignment of responsibilities must be addressed early on.

Importance:

Unless resolved, basins and storage agencies will be very hesitant to enter into conjunctive use agreements.

How to overcome the impediment:

- Extensive modeling at outset of program.
- Clear understanding of willingness to share cleanup responsibilities.

PRIORITY 7

Risk That Water Stored Cannot be Extracted When Needed Because of Infrastructure, Water Quality/Level, Politics, Institutional/Contractual Provisions

ORIGINATORS:

Jazmadarian on behalf of herself, Erb, and Falagan

The following impediments were subsumed under the above title:

Impediment title: **Lack of Pumping Capacity Due to Water Quality or System Deficiencies**

Originator: Erb

Impediment description:

- Lack of wells.
- Water quality problems (wells shut down).
- System impediments or deficiencies.

Importance:

Adequate and redundant pumping capacity is important to maintain flexibility to maximize groundwater production.

How to overcome the impediment:

- Funding.
- New wells.

- Research on water quality problems.
 - Regional partnership to help finance.
-

Impediment title: **Performance in a Drought of a System**

Originator: Falagan

Impediment description:

Performance: The inability to agree on how to guarantee dry-year production of a net increase over and above basin production levels to meet local and/or regional demands.

Importance:

The guarantee establishes the return on investment made in the program.

How to overcome the impediment:

- Ownership of wells by surface supplier.
 - Continuous accounting of set aside capacity.
 - Performance penalties.
-

Impediment title: **Risk That Water Stored Under the Program Cannot be
Extracted by MWD When It Needs the Water**

Originator: Jazmadarian

Impediment description:

MWD may not be able to extract the stored water during a time of need for several reasons:

- Lack of facilities (including the participating agency that has not maintained its facilities and is relying on MWD's new facilities to meet demands).
- Low basin levels.
- Water quality.

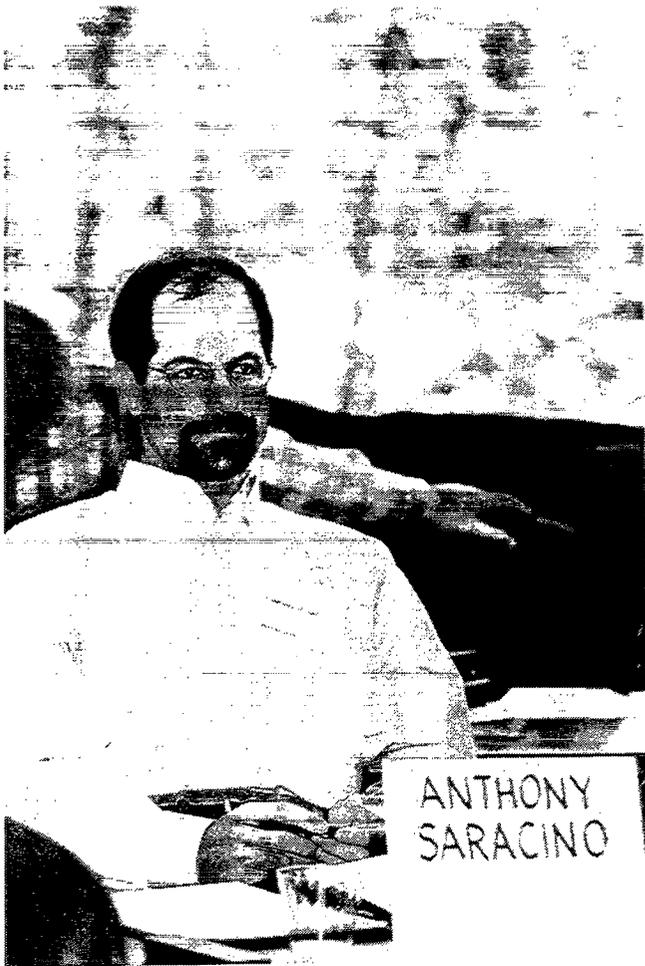
- Political reasons.
- Contract provisions (part of the program is required to meet overlying demands; however, agency has reduced average deliveries from MWD).

Importance:

MWD is relying on this water to be produced so that it can meet its goal of being 100% reliable. If this water is not produced, MWD has spent a significant sum of money and is not 100% reliable. It could have spent the money somewhere else to meet this reliability or in the case of agencies reducing demands on MWD, not as much conjunctive use of imported water may be needed.

How to overcome the impediment:

- Lack of Facilities: MWD should construct its own facilities to produce the water. These facilities, in conjunction with current agency facilities, should meet 100% of agency demands in summer months and supply shortage. If an agency does not continue to maintain its facilities, MWD should maintain and charge agency in water billing.
- Basin Levels Low: Basin levels should be monitored yearly with key wells and a minimum level (including MWD water) agreed upon between basin manager, MWD, and agency. Should basin drop below minimum, basin manger must replenish basin at MWD's replenishment rates.
- Water Quality: Since a large part of the problem with conjunctive use is importing water in MWD facilities, meet only overlying demands with program (also cheaper and easier). MWD should help, when feasible, with water quality. However, this is sometimes a risk that MWD must accept as part of conjunctive use.
- Political Reasons: Peer review done through either reports to Board and Member Agencies or Peer Review Committee to ensure that politics do not override agreement.
- Reduction of MWD Deliveries. Agency makes a commitment that it will not reduce the average MWD deliveries for term of contract or pay capital costs that MWD has invested and buy water from account, or at the front of contract state



PRIORITY 8

Lack of Assurances to Prevent Third-Party Impacts and to Increase Willingness of Local Citizens to Participate

ORIGINATORS:

Saracino on behalf of himself and Kelly

The following impediments were subsumed under the above title:

***Impediment title:* Lack of Willingness of Local Citizens to Participate in Developing a Conjunctive Use Project in Northern California**

***Originator:* Kelly**

Impediment description:

Groundwater programs that have been proposed or implemented in northern California over the past seven years have caused the local citizens to react very negatively. They fear losing the use of their water supply, experiencing higher pumping costs, and losing the opportunity of using additional water supply in the future. This fear and animosity makes it very difficult to include local citizens in discussions of possible conjunctive use projects and prevents possible willing participants from getting involved due to the hard feelings of their neighbors.

Importance:

This impediment essentially prevents the development of conjunctive use projects in northern California. The amount of water that could be developed is significant. Groundwater substitution programs provided between 160,000 acre feet and 260,000 acre feet in each of the State Drought Water Banks (1991, 1992, and 1994).

How to overcome the impediment:

Begin with an effort that demonstrates how a conjunctive use project could satisfactorily address third-party impacts. This process would focus on a specific conjunctive use project proposal and involve local citizens to identify specific concerns and solutions. The objective of the project would not be to maximize water supply while minimizing impacts but to develop mechanisms that assure the local citizens they will not be harmed or if harmed, they will be fully compensated.

Impediment title: **Lack of Assurances That Can Be Implemented to Prevent Third-Party Impacts Resulting From Conjunctive Use**

Originator: Saracino

Impediment description:

Stakeholders in areas of potential conjunctive use projects are concerned that significant, unmitigated impacts can arise from conjunctive operations. Impacts include reduced well yields, subsidence, water quality degradation, increased pumping costs, and loss of water rights.

Importance:

Stakeholders can be financially impacted as a result of conjunctive use operations. This impact can be quantified and can have significant influence on the true value of water.

How to overcome the impediment:

- Begin with pilot projects.
- Develop sufficient baseline data.
- Develop mitigation strategies and funding mechanisms.
- Develop contracts.
- Develop a groundwater management plan.
- Conduct long-term monitoring.

Lack of Creativity in Developing Lasting “Win-Win” Conjunctive Use Projects, Agreements, and Programs

ORIGINATORS:

Stewart on behalf of herself and Glaser

The following impediments were subsumed under the above title:

Impediment title: **Inability to Create New Instruments for Managing Unforeseen Risks or Problems**

Originator: Glaser

Impediment description:

Groundwater basin managers and MWD seem to require ironclad indemnification or risk allocation prior to concluding agreements.

Importance:

- Deal blocker.
- Reluctance to tie the hands of future boards.
- Unwillingness to take risks for fear of the unknown.
- Fear of looking bad.

How to overcome the impediment:

- Look at other industries to research comparable problems and solutions.
- Think out of the box for new approaches, such as escape or sunset clauses or revisiting terms periodically.

Impediment title: **Lack of Creativity in Developing Win/Win Conjunctive Use Projects**

Originator: Stewart

Impediment description:

- Refusal to consider conjunctive use unless water returned is of equal or better quality.
- Regional and local managers are not able to help local and regional interests achieve mutual benefits, and conjunctive use programs are not implemented.

Importance:

Missed opportunity for mutually beneficial conjunctive use programs.

How to overcome the impediment:

Recognize the true cost of storing water elsewhere or on the surface and commit to work toward win/win solutions from all levels.



Supplemental Suppliers and Basin Managers Have Different Roles and Expectations in Relation to Conjunctive Use

ORIGINATOR:

Sprague

The following impediment was subsumed under the above title:

Impediment title: Lack of Common Goal Between the Supplemental Supplier and Basin Managers

Originator: Sprague

Impediment description:

When the MWD considers conjunctive use, they are looking at it mainly from an importer's perspective. MWD is a supplemental supplier dealing with one supply from two sources (State Water Project and Colorado River Aqueduct). Groundwater managers must manage multiple supplies with varying availability to meet retail needs. The import supplier appears to be pushing the basins to operate to accommodate the import supply variable rather than the import supply as one element of groundwater management to meet retail needs.

Importance:

Without developing a common goal or finding a common need, we will not see maximized conjunctive use.

How to overcome the impediment:

The MWD should describe what they want as a dry-year deliverable, and the value to MWD. Basins and agencies would then be provided the opportunity to propose methods of providing the deliverable at a negotiable price.



Allocation of Regional Water Systems' Costs on the Basis of Annual Water Sales Does Not Provide Incentive to Efficiently Use Supply

ORIGINATORS:

Thomas on behalf of himself, Grindstaff, Saracino, and Stewart

The following impediments were subsumed under the above title:

Impediment title: Price of Water Does Not Accurately Reflect Cost

Originator: Grindstaff

Impediment description:

Cost is not accurately reflected in the price of water. For example, in drought years the price remains stable so there are no incentives to change how retail agencies operate.

Importance:

Planning is based on price but that does not encourage conjunctive use.

How to overcome the impediment:

Plan to increase the price of water in droughts so that everyone knows the future cost implications. Develop new pricing mechanisms that track actual costs closely. As hard as it is, a dramatic price increase during a drought is understandable particularly if costs go down at other times.

Impediment title: Not Knowing the True Value of Water and Water Storage

Originator: Saracino

Impediment description:

Water is valued in a variety of ways, resulting in water management inconsistencies and inefficiencies.

Importance:

Not knowing the true value of water impedes decision-making processes that could result in maximizing the effectiveness of water management decisions.

How to overcome the impediment:

Develop a method to determine the true value of water. This should include the effects of water management practices on the agricultural, urban, and environmental sectors.

Impediment title: Lack of Price Structure That Promotes Use and Development of Local Resources

Originator: Stewart

Impediment description:

The current price structure does not reflect annual and seasonal availability or provide some recognition of dependence on imported supplies. Also, prices are set without regard to ability or desire to store water.

Importance:

Reduces amount of water that is beneficially used and available for future use.

How to overcome the impediment:

Stop all “programs” and “projects” and create a price structure with a very significant difference in the cost to use water during times of low availability and high availability. This price difference should be implemented for a long enough period of time that the cost of new local facilities, such as wells, could be amortized quickly.

Impediment title: **Allocation of Regional Water Systems' Costs on the Basis of Annual Water Sales Does Not Provide Incentive to Efficiently Use Supply**

Originator: Thomas

Impediment description:

The price of imported water is set to recover the embedded cost of the regional delivery system rather than to provide water management signals. As a result, water rates are the same in surplus and shortage years, and groundwater agencies have no incentive to take surplus imported water in lieu of pumping groundwater.

Importance:

Financial signals are the driving force in basin management decisions. Water supply costs at the wholesale level should reflect marginal costs rather than embedded costs for economically efficient allocation of supply.

How to overcome the impediment:

Pricing policies that provide opportunity to reduce prices during surplus years and increase price during dry years under well-defined conditions would provide for more effective water management signals. Payments for the regional conveyance system should be separated from the price of the water supply. Water rates should reflect the impact of peaking on the regional supply system.



Inadequate Understanding of Water Management Among the California Citizenry and Politicians Making It Difficult to Build a Case for Conjunctive Use

ORIGINATORS:

Purkey on behalf of himself and James

The following impediments were subsumed under the above title:

Impediment title: **Lack of Need for Conjunctive Use Programs With the Current Water Supply**

Originator: James

Impediment description:

Thanks to El Niño, currently MWD's water sales are down, and both the State and Colorado aqueducts are flowing full. In less than three years, MWD will finish constructing a new reservoir that will double its current storage capability. Is there a need for more storage today?

Importance:

The main benefit of conjunctive use is to provide a supplemental water supply. When you have all the water you need, why would you want to spend money on a project that will provide an initial benefit to some while others will not realize a benefit for many years.

How to overcome the impediment:

Start implementing small conjunctive use projects that will ultimately be part of a larger conjunctive use project.

Impediment title: **Inadequate Understanding of Water Management Among the California Citizenry and Many Politicians**

Originator: Purkey

Impediment description:

The general public has very little understanding of California water management, and yet they will be asked to bear the financial burden of future initiatives. A lack of understanding among certain politicians is leading to defensive policy initiatives.

Importance:

This impediment is important because we need fully informed and engaged stockholders to be able to work out the details of conjunctive use arrangements and to avoid the deal killers emerging at the eleventh hour.

How to overcome the impediment:

- Public education in all aspects of water managers.
- Outreach through traditional and new media.
- Institution of broad participation, focused issue, stockholder forums.
- Development of analytical tools which can guide stockholders through the process of negotiating a consensus for conjunctive use.

Lack of Understanding of the Effect of Recharge and Extraction Within the Basin

ORIGINATORS:

McVicker on behalf of himself, Hauge/Bachman, Haslebacher, and Purkey

The following impediments were subsumed under the above title:

Impediment title: **Storage Projects Mask the True Condition of Basins**

Originator: Hauge/Bachman

Impediment description:

Many of the basins that are good candidates for storage have been drafted deeply in the past to create the storage. When water is stored, the possible poor condition of the basin is masked. When stored water is withdrawn, a crisis may occur in the basin.

Importance:

If a crisis occurs during withdrawal, legal problems and bad publicity may entangle the storage project.

How to overcome the impediment:

- Clearly stated plans for extraction of stored water.
- Monitoring/modeling to determine state of basin.
- Well-publicized scenarios of state of basin following extractions.
- Contingency plan for basin crisis.

Impediment title: **Implementation of Effective Groundwater Level and Groundwater Quality Monitoring Programs**

Originator: Haslebacher

Impediment description:

- Lack of desire to know groundwater conditions.
- Short-term incentive to avoid collection of data.
- Funding.
- Public access of data.
- Quality assurance and quality control of data.
- Development of accessible database.

Importance:

- Monitoring of groundwater on an historic basis necessary for developing regional/local baseline conditions, pre-project conditions, and conditions resulting from project.
- Data important for resolving disputes, predicting impacts, developing “best use” criteria for operation of the groundwater basin. Necessary for model development.

How to overcome the impediment:

- Agreements between all users in basin to monitor groundwater conditions in local entities.
- Central clearinghouse for data.
- Independent hydrogeological interpretations of data.

Impediment title: **Lack of Understanding on How Basin Will React to Increased Recharge and Pumping**

Originator: McVicker

Impediment description:

- The amount of conjunctive use possible and negotiation of agreements depends on recharge capacity, pumping capacity and storage, and its usage.
- Other programs have impacted basin management and reduced the ability to participate in conjunctive use.
- Water quality issues, seawater barrier/intrusion.

Importance:

- Reduce level of risk.
- Coordinate groundwater producer plans.
- Develop tool to assess various programs.

How to overcome the impediment:

Develop models of surface water/groundwater system for basin and update model as basin is stressed from increased pumping and recharge.

Impediment title: **Uncertainty Regarding the Environmental Role of Peak Flows**

Originator: Purkey

Impediment description:

Conjunctive use generally seeks to capture excess surface water during wet water years. This can be accomplished by diverting peak flows or by reoperating reservoirs to capture additional water in surface reservoirs. Both modalities will result in shaving off peak hydrograph spikes. There remains uncertainty regarding the environmental effects of removing these peak flows.

Importance:

This uncertainty is important because the absence of peak flows could alter fluvial processes to the detriment of the aquatic ecosystems. This should be avoided. Perhaps more importantly, the uncertainty provides a trump card for parties opposed to the implementation of conjunctive use programs. It could also initiate complex negotiations similar to the struggles to set minimum in-stream flows.

How to overcome the impediment:

The best way to overcome this impediment is through the implementation of adoptive management strategies. We can discuss, even model, the sediment carrying capacity of peak flows for years in an attempt to build consensus around required peak flows, or we can let the river serve as a model of itself and observe the geomorphologic response, and habitat implications, of altered flow regimes. Management changes would then be prompted by changes in measured indicators.



Lack of a Clearly Defined Shortage Allocation Plan for Imported Water

ORIGINATOR:

Thomas

Impediment description:

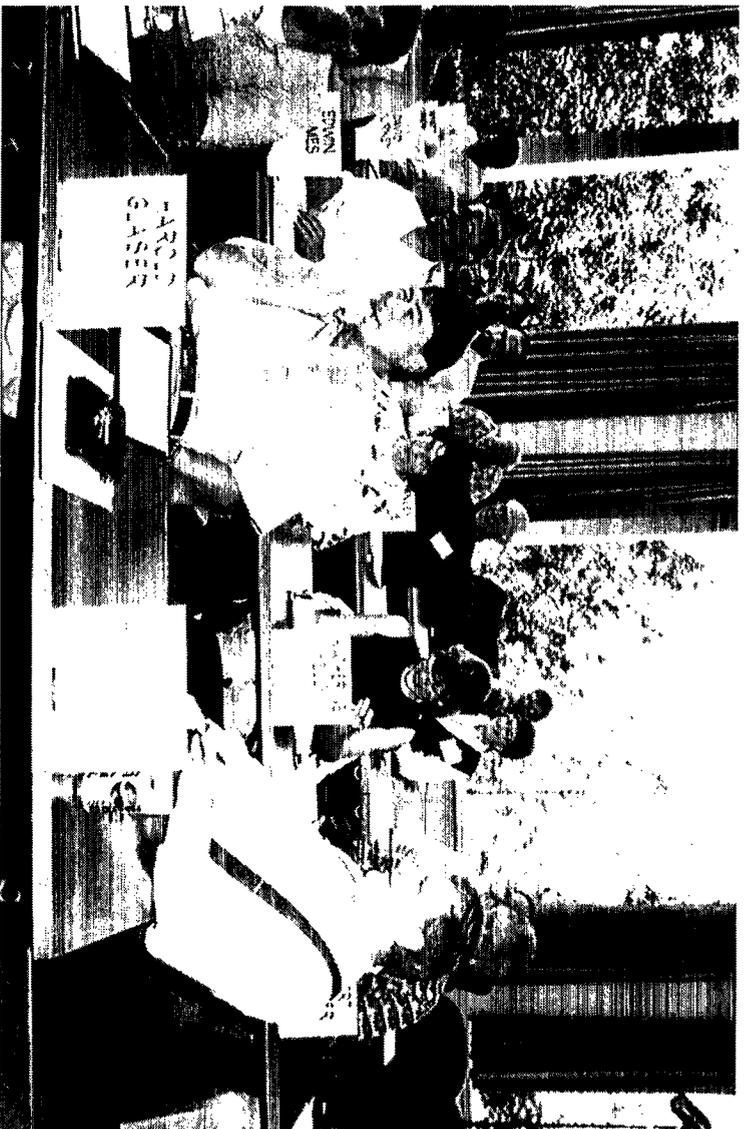
Groundwater agencies do not have clear signals regarding their responsibilities during droughts, and import-dependent agencies fear that they will be short of water while groundwater agencies have sufficient supplies.

Importance:

The value of groundwater basins cannot be determined unless performance objectives are defined.

How to overcome the impediment:

- Allocate imported supplies on the basis of payments to the system.
- Ensure that interruptible supplies are indeed interruptible.



Lack of Public Debate/Understanding of What Water as a Commodity vs. as a Public Resource Means

ORIGINATORS:

Means on behalf of himself and Grindstaff

The following impediments were subsumed under the above title:

***Impediment title:* Lack of Desire to Provide Incentives for Groundwater Basins to Store Water**

***Originator:* Grindstaff**

Impediment description:

Belief by some that groundwater basin storage should not be a profit-making opportunity.

Importance:

There will be no incentive for agencies to take actions that benefit others unless the agencies' achieve some benefit such as water quality improvement.

How to overcome the impediment:

Explore some price setting mechanisms, such as a Request for Proposal.

Impediment title: **Lack of Public Debate/Understanding of What Water as a Commodity vs. as a Public Resource Means**

Originator: Means

Impediment description:

Debates of “markets” and “wheeling” being conducted in a politicized environment without understanding implications. This may lead to unintended consequences. There has been little debate regarding definition of reasonable profit from groundwater storage agreements.

Importance:

Recovery of capital costs of facilities is yet to be resolved through the courts. In instances where wheeling rates do not recover capital costs, the ability to finance future facilities will become uncertain. The state has yet to address the implications of wheeling pricing on future facility construction. How water management programs like conservation and recycling will be funded in an “open” market has yet to be discussed. The issue of providing water to poorer communities in an “open” market where larger cities/special districts can command the lowest prices has yet to be resolved.

How to overcome the impediment:

- Resolve MWD strategic direction through its current strategic planning effort.
- Engage academic institutions to assess this issue.

Administrative Constraints Within Programs Resulting in In-Lieu Recharge Limitations, Failure to Maximize Wet-Year Storage, and Conflict in Dry-Year Production

ORIGINATORS:

Stewart on behalf of herself, Jazmadarian, McVicker, and Sprague

The following impediments were subsumed under the above title:

Impediment title: Conflict With the New Conjunctive Use Program and Other Storage Programs Such as Seasonal Storage Service, Cooperative Storage, and Cyclic Storage

Originator: Jazmadarian

Impediment description:

Many of MWD's agencies wishing to enter a new conjunctive use program already participate in other storage programs that MWD offers. These programs include the Seasonal Storage Service Program, Demonstration Water Program, Cooperative Storage Agreements, and Cyclic Storage.

Importance:

Provisions in the new conjunctive use program and the other programs might conflict. Additionally, some of the other programs might not be as effective as the new program.

How to overcome the impediment:

- Incorporate the good points of old programs into the new program.
 - Transfer storage in some of the accounts, such as the Cooperative Storage Program, to the new conjunctive use program.
 - Combine the Seasonal Shift component of the Seasonal Storage Service Program with the conjunctive use program so that agencies are doing seasonal shifting in years needed. For other years, it may be more beneficial to store water during the summer.
-

Impediment title: **Limits on Indirect Recharge (In-Lieu) Due to the Requirement to Qualify for Shift Credits and Seasonal Availability of Discounted Water**

Originator: McVicker

Impediment description:

A requirement that agencies not “peak” on imported water supplies disqualifies many agencies. If a pumping plan is valid or water rights are retired, indirect recharge (in-lieu) water should be available at the discounted price.

Importance:

Lack of surface recharge capacity or injection well capacity can be overcome using indirect recharge (in-lieu).

How to overcome the impediment:

- Drop the requirement for shift qualification for agencies with verifiable pumping plans or ability to retire water rights.
- Extend availability when able.
- Have separate shift program or penalty for peaking on imported water supplier.

Impediment title: **The Lack of In-Lieu Programs to Maximize Wet Year Imported Groundwater Storage**

Originator: Sprague

Impediment description:

During wet years, extraction of groundwater should be minimized by meeting retail demands through the use of imported water thereby leaving groundwater stored for dry-year yield.

Since capture and percolation of local runoff is a basin's first priority which then limits opportunities to spread surface water for percolation, in-lieu storage may be the only method to store imported water during wet years. Therefore, in-lieu storage should be encouraged any time imported water is available to take full advantage of storage opportunities.

Importance:

Without the ability to store by in-lieu methods, wet-year water may go unused and dry-year yield will be less.

How to overcome the impediment:

Obstacles such as the Seasonal Shift Program should be removed so that in-lieu storage during summer, or any time, can be accomplished. In-lieu storage should be calculated based on agencies' and basins' normal operations using some form of pre-agreed upon Operating Plans. Agencies/basins should develop calculation methods for in-lieu storage to assure that imported water has been stored and can be produced.

Impediment title: **Imposition of Artificial Constraints Set by Supplemental Supply Agencies**

Originator: Stewart

Impediment description:

Supply agencies establish criteria to determine whether an exchange for surface water in lieu of pumping is "actually" increasing "storage" or "yield." Common sense and real world demonstrations prove cessation of pumping means water is left in the ground.

Importance:

Significant conjunctive use opportunities are being missed and so are future sales.

How to overcome the impediment:

Stop imposing artificial, "control-based" criteria to a fundamental subject. Focus on delivery of water and "the sales will come."



Lack of Market Conditions, Policies, and Guidelines for Wheeling Water for Conjunctive Use

ORIGINATORS:

Miller on behalf of himself, Kelly, and Yamada

The following impediments were subsumed under the above title:

Impediment title: Lack of Ability to Develop Long-Term Conveyance Agreements in the California Aqueduct for Water Transfers

Originator: Kelly

Impediment description:

Long-term conveyance agreements do not exist, and will be needed, for water transfers conveyed through the California Aqueduct. The State Water Contractors are reluctant to compromise their priority for use of the aqueduct and definitely want full compensation for its use. Delta restrictions for exports limit the use of the aqueduct which further decreases the potential for transfers.

Importance:

The incentive to develop conjunctive use projects for supply to users outside of the project area is dependent upon long-term certainty of conveyance to the users.

How to overcome the impediment:

- Improve reliability of conveyance through the Delta.
- Enter into discussions to address long-term conveyance issues of the California Aqueduct and to establish a conveyance charge that does not prohibit transfers, yet fairly covers facility and operational costs.

Impediment title: **Lack of Open Market Conditions for Transferring Water**

Originators: Miller/Bachman

Impediment description:

Open market conditions for buying, selling, and transferring water only partially exist in the state. Impediments that exist include artificially high wheeling costs by MWD and county restriction on water exporting that are not technically based.

Importance:

If conjunctive use is to be maximized, water transfers need to be optimized. If open market conditions will help these transfers, artificial impediments need to be removed.

How to overcome the impediment:

- Statewide planning to identify opportunities/impediments.
- Removal of artificial impediments by friendly persuasion.

Impediment title: **Lack of Coordinated Policies and Guidelines that Support Interagency Groundwater Storage and Conveyance of Stored Water**

Originator: Yamada

Impediment description:

Currently, there are not clear coordinated policies and guidelines that would facilitate the storage and conveyance of water between agencies (particularly distant agencies).

Importance:

Resolving this impediment would help to optimize the use of the region's groundwater and would help to resolve differences between the "haves" and the "have-nots" based on a mutually beneficial goal.

How to overcome the impediment:

Establish a regional task force to tackle such issues as intra-system wheeling, return water quality, and legal issues.





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110

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Lack of Agreement on Storage Calculation Methods Resulting in Concerns as to Amount of Water Stored, Appropriate Use of Incentives, Value of Incentives

ORIGINATORS:

Jazmadarian on behalf of herself and Yamada

The following impediments were subsumed under the above title:

Impediment title: **Concern That Water Delivered at a Discount or No Cost Is Not Stored but Going to Decrease an Agency's Water Rates**

Originator: Jazmadarian

Impediment description:

When MWD delivers water to storage, it should be importing more water and increasing deliveries, not just replacing sales. The agency should be using discounts to invest in facilities.

Importance:

When it comes time to produce water, it may not be possible. Sales are foregone by MWD shifting costs without benefits to other agencies.

How to overcome the impediment:

Ensure that water is being stored, and money is being used appropriately.

Impediment title: **Lack of Regional Consensus on the Value and Calculation of In-Lieu Storage Incentives**

Originator: Yamada

Impediment description:

A variety of viewpoints exist on how in-lieu deliveries should be calculated/credited, and the amount of in-lieu storage needed to meet the region's dry-year supply needs.

Importance:

The concept of in-lieu storage is a key component in the development of any new conjunctive use incentive programs. Regional investments based on in-lieu storage must be commensurate with regional benefits. A basic understanding is essential.

How to overcome the impediment:

An open process whereby the value of in-lieu storage can be understood and debated by the policy makers.

Land Use Zoning Does Not Adequately Address Water Management, Water Contamination, and Recharge Issues

ORIGINATORS:

Hauge on behalf of himself, Haslebacher, and Means

The following impediments were subsumed under the above title:

***Impediment title:* Land Use Zoning Does Not Adequately Address Consideration of Water Management and Recharge Issues**

Originator: Hauge

Impediment description:

- The effectiveness of recharging aquifers in any groundwater program may be reduced.
- Agencies may be required to serve new customers even though they are water-short for existing customers.
- Recharge areas may be pared so they can no longer be used.

Importance:

- Reduces usefulness of the aquifer and the amount of water that is available.
- Produces water shortages.

How to overcome the impediment:

Better education of city and county elected officials.

Impediment title: **Lack of Identification and Protection of Lands Suitable for Groundwater Recharge Facilities**

Originator: Haslebacher

Impediment description:

Areas suitable for groundwater recharge that combine hydrogeology, recharge water source, and conveyance facilities are rare and getting more scarce due to urban development and agricultural uses (dairies).

Importance:

Without access to groundwater recharge areas, conjunctive use programs lose their effectiveness.

How to overcome the impediment:

- Local and state safeguards to lands suitable to groundwater recharge must be enhanced.
- Increased awareness by citizens, policy makers, and politicians about the value of these lands.
- Implement programs to identify and determine the hydrogeologic parameters of lands suitable for groundwater recharge programs.

Impediment title: **Inadequately Controlled Agricultural Non-Point Source Pollutant Loads**

Originator: Means

Impediment description:

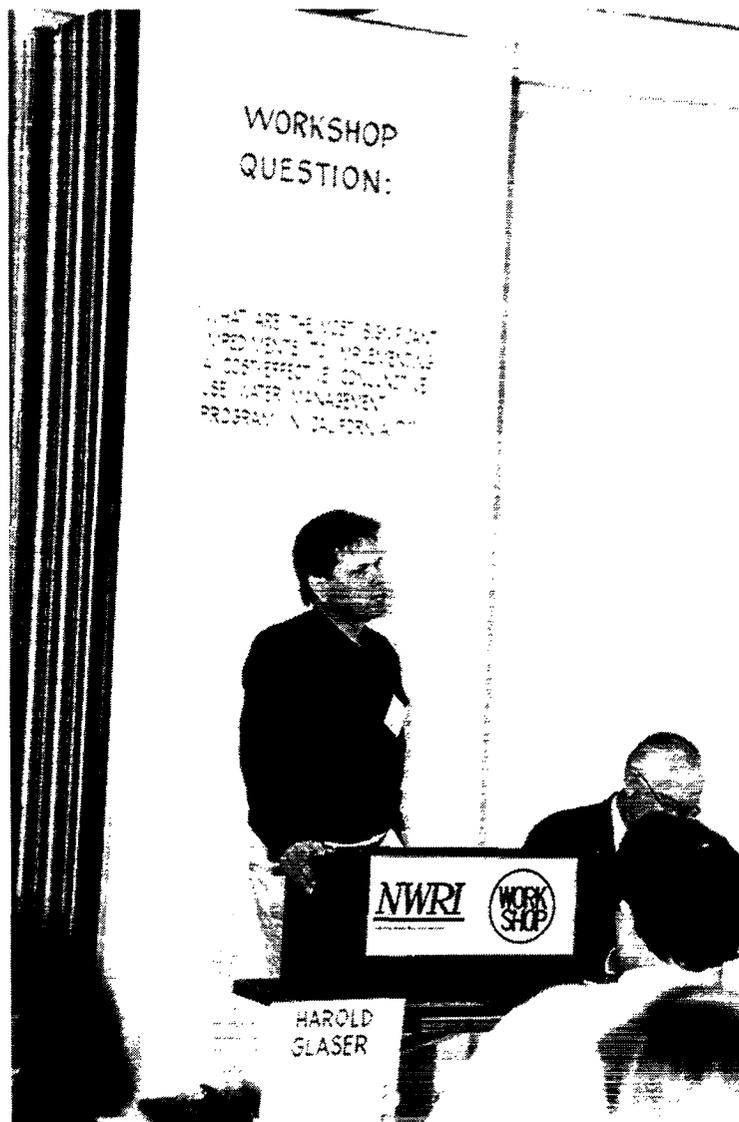
Inadequate controls over storage/land application of dairy wastes, which contaminate groundwater.

Importance:

Waste threatens basin with contaminants/salt that can reduce value of the basin as a water source.

How to overcome the impediment:

Charge one cent per gallon of milk produced to go into a cleanup fund or impose a charge on each product produced for remediation.





Lack of Adequate Surface Water Storage in California to Provide Flexibility to Maximize Conjunctive Use Programs

ORIGINATOR:

Haslebacher

Impediment description:

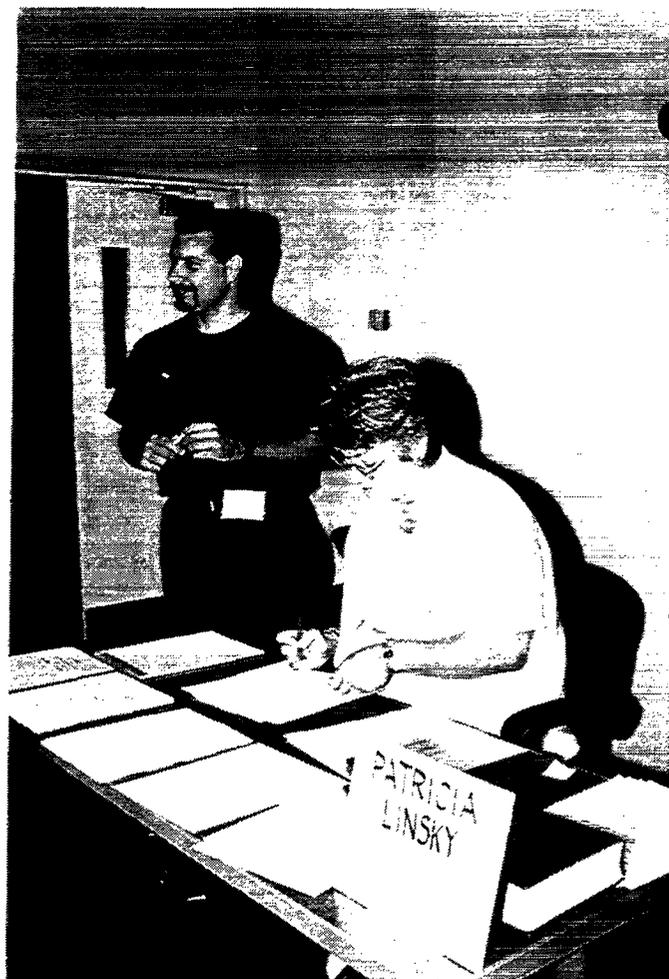
Lack of adequate surface water storage in the San Joaquin Basin and Sacramento Valley has a limiting effect on a conjunctive use program to utilize supplies of surface water which peak during winter and spring, due to delivery constraints caused by the Bay/Delta problem. Highest demands (municipal, industrial, and agricultural) come during summer and fall. Without storage, surface waters cannot be used most efficiently. This creates an increasing burden on the groundwater system.

Importance:

Groundwater users have built their systems around their groundwater resource availability. Peak demand usually occurs during daylight hours throughout the growing season (agriculture). Except for periods of low water tables (drought), groundwater does not have delivery limitations, except for quantity issues. Surface water, without adequate storage, is available during winter and spring when demand is low.

How to overcome the impediment:

More surface water storage facilities need to be built downstream of Delta and north of the Tehachapi Mountains. However, environmental, facilities, and funding issues need to be resolved. Ultimately, all issues must pass the approval of the affected populations.



Lack of a Single Entity Overseeing Groundwater Recharge/Recovery Operation, Target Aquifers, and Points-of-Use

ORIGINATORS:

Purkey on behalf of himself and Haslebacher

The following impediments were subsumed under the above title:

***Impediment title:* The Lack of the Formation of Entities for Groundwater Recharge and Groundwater Banking Activities**

***Originator:* Haslebacher**

Impediment description:

Due to competing interests concerning the operation of groundwater recharge facilities and groundwater banking activities, an oversight entity is needed to establish standards for conducting and measuring recharge and recovery operations. Maintain records/accounts; ensure that established groundwater management principles are followed; and provide a forum for resolution of disputes between groundwater banking participants and overlying users.

Importance:

Groundwater recharge and recovery are major components in the conjunctive use equation. The larger the conjunctive use program, the more participants and overlying users will be affected. Groundwater banking projects are necessary to allow entities with little or no groundwater resources to participate in conjunctive use programs. Banking projects, however, pit participants (out of basin exporters) against overlying users (in basin use). Without firm guidelines and oversight, adverse effects of banking (subsidence, groundwater quality degradation, and increased pumping costs) can be devastating.

How to overcome the impediment:

All participants and overlying users should sign a single agreement in the form of a Memorandum of Understanding (MOU). This agreement must be legal and binding, yet flexible as to allow a banking project to change according to the needs of the conjunctive use program. For example, agricultural lands changing to urban or preservation of agriculture by means of firm, affordable water resources. This MOU must also set the foundation of account agreements and most importantly, establish the "oversight entity" with broad powers of regulation for the project. The entity must have the ability and direction to quantify and publish the effects, both beneficial and adverse, of the project.

Impediment title: **Difficulty Negotiating Storage and Recovery Arrangements When Surface Water, Target Aquifers, and Points-of-Use Are Controlled by Different Entities**

Originator: Purkey

Impediment description:

The required parties to a storage and recovery arrangement often have different, occasionally conflicting, objectives. Holders of surface water rights and operators of surface water infrastructures seek to maximize the benefits they can derive from these resources. Overlying landowners/pumpers often seek to secure additional water to mitigate local overdrafts. End-users want to have a more reliable water supply at least cost. When a fixed resource is allocated, each of these objectives may not be simultaneously achievable.

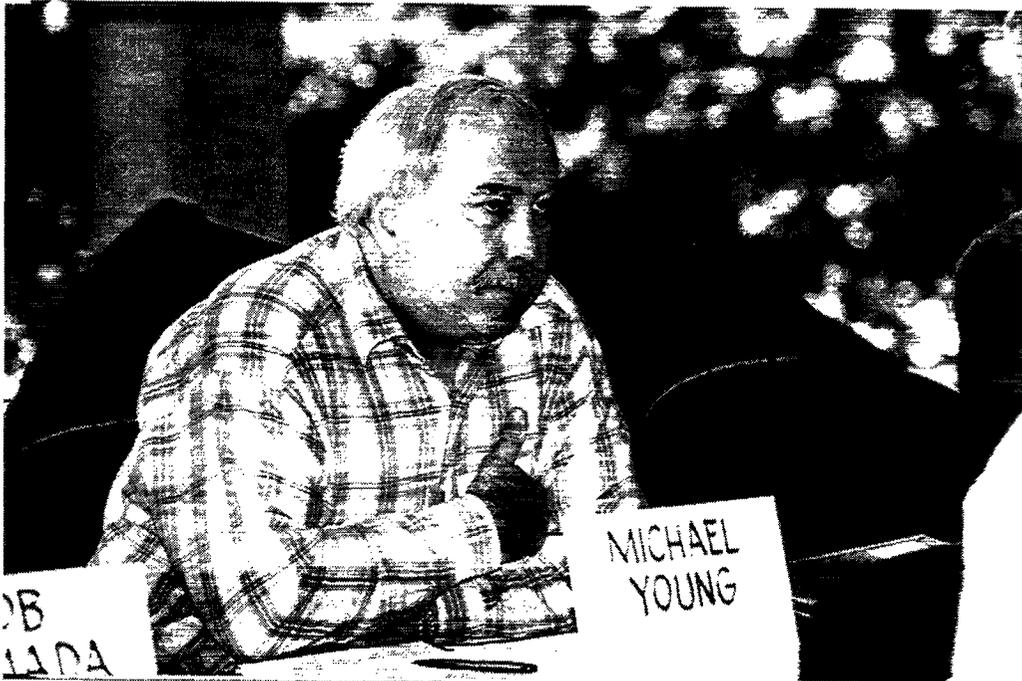
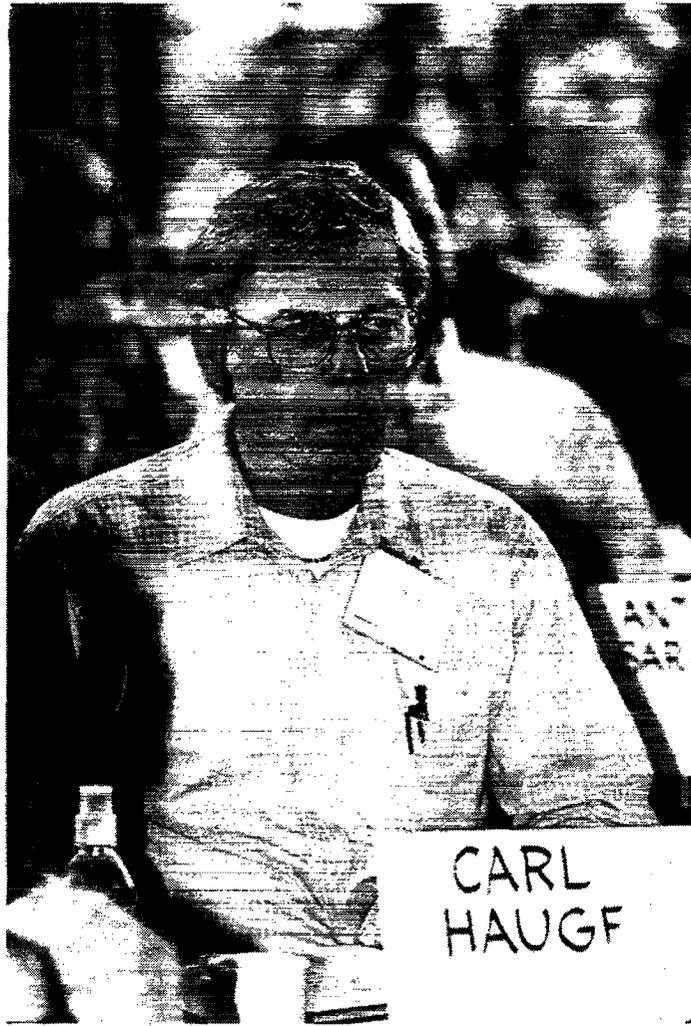
Importance:

This impediment is fundamentally important as the inability of all parties to fully achieve their objectives has, on occasion, undermined negotiations that could have produced real benefits to all parties involved. The transaction costs of failed negotiations are lost and can be substantial. The new water yield that is not generated because of a lack of durable arrangements can also be substantial, one million acre-feet annually according to research by the Natural Heritage Institute.

How to overcome the impediment:

This impediment will be overcome when a broadly accepted framework for conducting negotiations is established. One element of this framework must be the existence of broadly accepted analytical tools that can be used to quickly and convincingly screen different storage and recovery arrangements and rules. Reliable screening of opportunities needs to precede the massive investment required to operationalize conjunctive use programs.





Lack of Awareness of the Real Expense of Properly Designed Groundwater Management and Conjunctive Use Programs

ORIGINATORS:

Hauge on behalf of himself and Young

Impediment description:

- Lack of enforcement of groundwater protection policies.
- Perception that the production of groundwater is always cheap.
- Abandoned wells throughout California are contaminating groundwater and should be destroyed.
- Groundwater contamination is a ticking time bomb, but it is a problem that could have been prevented.
- Development of adequate monitoring programs - water quality and water quantity.
- Proposed conjunctive use projects sometimes are perceived as moneymaking opportunities.

Importance:

People are misled into believing that groundwater should be cheap. Therefore, they are unwilling to consider spending money.

How to overcome the impediment:

- Begin to treat groundwater with the understanding that despite prevailing dogma, there is a cost for proper management of the groundwater basin.
- Basin operators should recognize the “time” value of stored water.
- A charge for storage of water in the aquifer should be established.

The following impediments were subsumed under the above title:

Impediment title: **Common Belief that Groundwater Programs Should Be Cheap, and That They Should Not Cost Much**

Originator: Hauge

Impediment description:

- Lack of enforcement of groundwater protection policies.
- Perception that the production of groundwater is always cheap.
- Abandoned well destruction policy.
- Groundwater contamination is a ticking time bomb, but it is a problem that could have been prevented.

Importance:

People are misled into believing that the groundwater should be cheap. Therefore, they are unwilling to consider spending money.

How to overcome the impediment:

Begin to treat groundwater with the understanding that despite prevailing dogma, there is a cost for proper management of the groundwater basin.

Impediment title: Excessive Cost of Establishing a Conjunctive Use Program

Originator: Young

Impediment description:

The owners/users of basins want the storing entity to pay excessive costs, such as drilling new wells and storage costs. This is in addition to the cost of obtaining, transporting, and extracting the water. Some may even see it as a moneymaking opportunity.

Importance:

It drives the cost up so much that other storage options are cheaper. When storage is not placed in the basins, the basin is at risk. In the "old days," each basin manager was responsible for maintaining and extracting the safe levels in his basin. Now much of the reserve water has been mined. This has resulted in either lower water levels or basin managers have removed the reserve water to make room for stored water resulting in no improvement in reserves, just shifting of cost.

How to overcome the impediment:

Basin operators should recognize the true value of stored water. Establish a cost per acre-foot storage charge.



TDS Level of Colorado River Water

ORIGINATORS:

Means on behalf of himself and Jazmadarian

The following impediments were subsumed under the above title:

Impediment title: Requirement That Basin Be Replenished With Only State Project Water Rather Than Colorado River Water

Originator: Jazmadarian

Impediment description:

Because of high concentrations of total dissolved solids (TDS), basin managers prefer that basins be replenished with lower TDS State Project Water rather than with high TDS Colorado River water.

Importance:

This may raise the price of the conjunctive use program too high since facilities are not in place to deliver State Project Water to all basins. Additionally, MWD may be foregoing deliveries of Colorado River water, its cheaper source, for State Project Water, more expensive, thus driving the water rate higher.

How to overcome the impediment:

Where possible, deliver a blend of water. Also, use injection wells and in-lieu deliveries. Find a permanent solution to Colorado River TDS!

Impediment title: TDS Level of Colorado River Water

Originator: Means

Impediment description:

Basin salinity objectives are exceeded in some basins when Colorado River water is spread. While “spreading” Colorado River water is not a waste discharge per se, concern exists that the Colorado River water salt load damages the basin.

Importance:

An opportunity to spread comparatively inexpensive Colorado River water is lost, and water is lost to the system.

How to overcome the impediment:

- Desalt Colorado River water.
- Relax basin salinity objectives; accept higher TDS implications.
- Blend.
- Increase salt management efforts on Colorado River.
- Increase state sensitivity to salt loading implications of Delta salt intrusion.

Impediment title: Basin Salinity Objectives Reassessment

Originator: Means

Impediment description:

Some basin objectives may not be reasonable or practical.

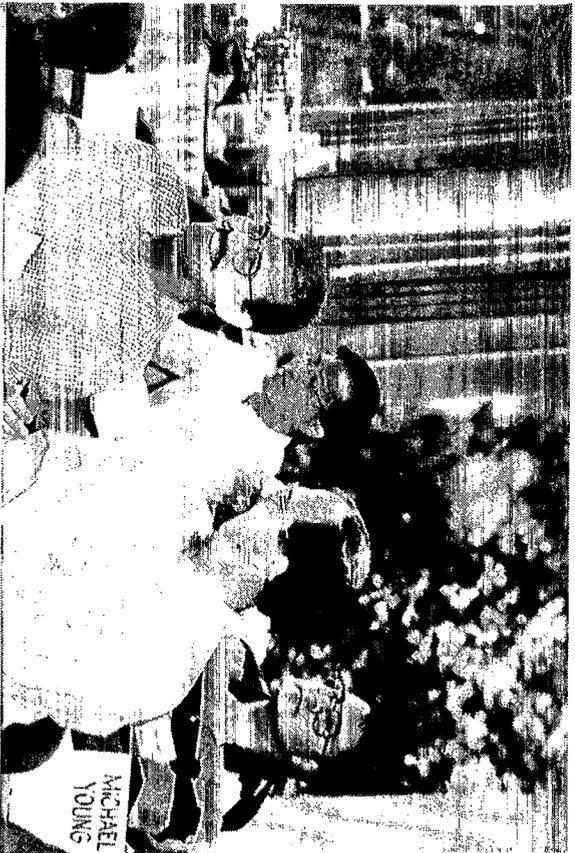
Importance:

Creates barriers to recharge with higher TDS water (imported or reclaimed).

How to overcome the impediment:

Process to reassess objectives.





130

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Current Uses of Existing Facilities May Conflict with the Realization of Conjunctive Use Opportunities

ORIGINATORS:

Purkey on behalf of himself, McVicker, and Young

The following impediments were subsumed under the above title:

***Impediment title:* Lack of Recharge Capacity for Imported Water With Spreading Capacity Used for Storm Water and Recycled Water**

Originator: McVicker

Impediment description:

- Surface recharge capacity is limited, and priority is given to low cost sources, such as storm water and recycled water.
- There is an increase in use of recycled waste for recharge.
- Indirect (in-lieu) recharge is limited by the need to qualify for shift and the seasonal availability.

Importance:

Recharge during wet cycles is one of the key components to successful conjunctive use of available groundwater storage.

How to overcome the impediment:

Develop a specific conjunctive use plan for each basin and adjust requirements for import water discounts based on the specific needs for each basin.

Impediment title: Reoperating Surface Water Facilities to Take Advantage of Groundwater Storage Opportunities May Conflict With Other Reservoir Operation Objectives

Originator: Purkey

Impediment description:

One way of operationalizing conjunctive use involves pre-delivery of surface water via in-lieu arrangements. This leaves extra capacity to capture additional surface water during the following rainy season. Below average precipitation in the following year could result in lower lake levels which could compromise power and recreation uses.

Importance:

The power generation and recreation benefits of surface water facilities have been used to arrange for the financing of these projects. If revenues from these sources are lost or reduced, project financing could be jeopardized and beneficiaries mobilized to oppose the plan. Incidentally, there is a temperature requirement for downstream fisheries that could also be compromised by low lake levels.

How to overcome the impediment:

Integrate the planning of conjunctive use with planning for other reservoir purposes. Lake Oroville is a good example of where recreation planning seems to be taking place outside of water planning. Perhaps formulas governing the priority of reservoir uses under various hydrologic conditions need to be negotiated.

Impediment title: Lack of Defining Local Storage vs. Regional Storage

Originator: Young

Impediment description:

- Some basins have been mined extensively leaving the basin low.
- Water under a conjunctive use label is simply used to refill basins, thus only protecting overlying users.

Importance:

Programs that are paid for regionally should offer some value to the agencies paying for conjunctive use.





134

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PRIORITY 25

Lack of Consistent Regulatory Approval Process

ORIGINATOR:

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Impediment description:

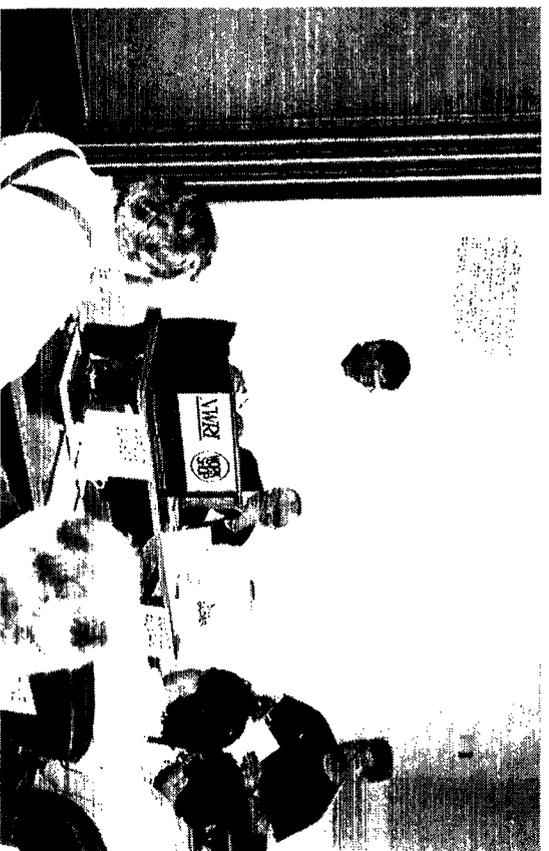
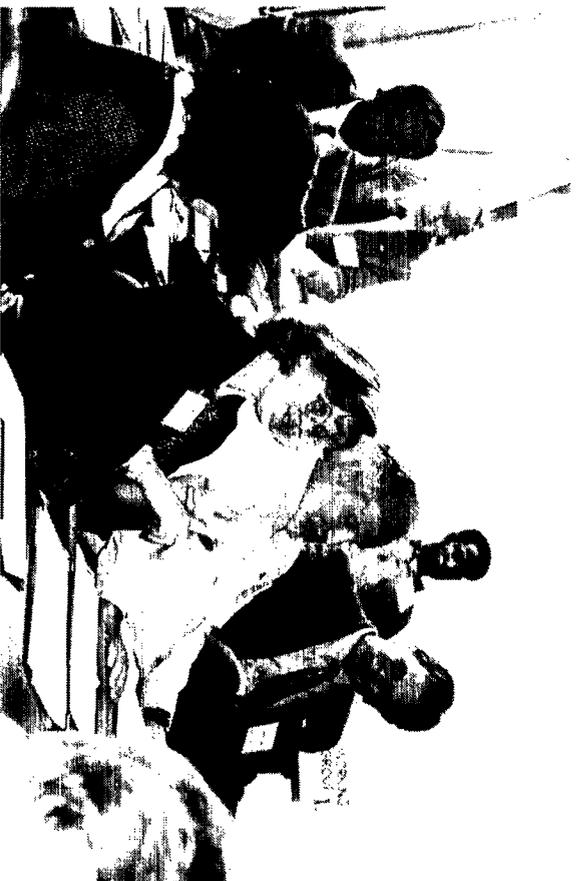
Local regional water quality control boards have distinct approval processes that may not be consistent.

Importance:

A clear, consistent approval process can expedite development of conjunctive use.

How to overcome the impediment:

Establish statewide standards for approval process.



Long-Term Hydrology vs. Short-Term Weather Events and the Misconception That Engineering Analysis Can Provide Certainty

ORIGINATOR:

Hauge

Impediment description:

Myth: We control or can out-fox nature (we can control the amount of water available).

Reality: We must adjust.

Importance:

We are dependent on whatever water is available. This will vary, and our water supply policies should reflect this reality.

How to overcome the impediment:

More education.



STRENGTH OF FEELING OF PARTICIPANTS AND SUBGROUP ANALYSIS

The following five tables provide a quantitative sense of the degree of agreement (or lack of agreement) regarding impediment priorities between 25 individual participants as well as between participants comprising the four subgroups. The subgroups represented include local agency participants (13), regional agency participants (5), state agency participants (2), and private sector participants (5).

The strength of feeling tables show the number of times each impediment was chosen by a participant as well as the total number of points it received. A priority rank of one (highest) gives ten points to that particular impediment and a priority rank of ten (lowest on the ranking sheet) gives one point to the impediment. The strength of feeling expressed as a percentage assigns a numerical "grade" to the group's unanimity (or lack of unanimity) for each impediment they ranked. For example, if every participant selected the same impediment as his or her highest priority then that impediment's strength of feeling will be 100%. If nobody selected the impediment, then its strength of feeling will be zero. Intermediate strengths-of-feeling are computed by dividing the total number of points an impediment received on all the ranking sheets by the total number it could have possibly received (times 100) if each participant had selected it as his or her top priority.

TABLE 1

All Impediments (26) Ranked by All Participants (25)

Rank	Title	Times Picked/Pts.	Strength Of Feeling
1.	Inability of Local and Regional Water Governance Entities to Build Trust, Resolve Differences (Internally and Externally), and Share Control	22/174	69.6%
2.	Inability to Match Benefits and Funding Burdens in Ways That Are Acceptable to All Parties, Including Third Parties	18/126	50.4%
3.	Lack of Sufficient Federal, State, and Regional Financial Incentives to Encourage Groundwater Conjunctive Use to Meet Statewide Water Needs	16/117	46.8%
4.	Legal Constraints Impede Conjunctive Use Regarding: Storage Rights, Basin Judgements, Area of Origin, Water Rights, and Indemnification	19/122	44.8%
5.	Lack of Statewide Leadership in the Planning and Development of Conjunctive Use Programs as Part of Comprehensive Resource Planning, and Recognizing Regional and Stakeholders' Interests	16/106	42.4%
6.	Inability to Address: Quality Differences in "Put" vs. "Take"; Standards for Injection, Export, and Reclaimed Water; and Unforeseeable Future Groundwater Degradation	14/77	30.8%
7.	Risk That Water Stored Cannot be Extracted When Needed Because of Infrastructure, Water Quality/Level, Politics, Institutional/Contractual Provisions	14/72	28.8%
8.	Lack of Assurances to Prevent Third-Party Impacts and to Increase Willingness of Local Citizens to Participate	12/68	27.2%
9.	Lack of Creativity in Developing Lasting "Win-Win" Conjunctive Use Projects, Agreements and Programs	13/68	27.2%
10.	Supplemental Suppliers and Basin Managers Have Different Roles and Expectations in Relation to Conjunctive Use	12/67	26.8%
11.	Allocation of Regional Water Systems' Costs on the Basis of Annual Water Sales Does Not Provide Incentives to Efficiently Use Supply	10/53	21.2%
12.	Inadequate Understanding of Water Management Among the California Citizenry and Politicians Making It Difficult to Build a Case for Conjunctive Use	9/42	16.8%

Rank	Title	Times Picked/Pts.	Strength Of Feeling
13.	Lack of Understanding of the Effect of Recharge and Extraction Within the Basin	7/36	14.4%
14.	Lack of Clearly Defined Shortage Allocation Plan for Imported Water	9/32	12.8%
15.	Lack of Public Debate/Understanding of What Water as a Commodity vs. as a Public Resource Means	8/32	12.8%
16.	Administrative Constraints Within Programs Resulting in In-Lieu Recharge Limitations, Failure to Maximize Wet-Year Storage, and Conflict in Dry-Year Production	9/31	12.4%
17.	Lack of Market Conditions, Policies and Guidelines for Wheeling Water for Conjunctive Use	5/31	12.4%
18.	Lack of Agreement on Storage Calculation Methods Resulting in Concerns as to Amount of Water Stored, Appropriate Use of Incentives, Value of Incentives	10/27	10.8%
19.	Land Use Zoning Does Not Adequately Address Water Management, Water Contamination, and Recharge Issues	6/22	8.8%
20.	Lack of Adequate Surface Water Storage in California to Provide Flexibility to Maximize Conjunctive Use Programs	3/18	7.2%
21.	Lack of a Single Entity Overseeing Groundwater Recharge/Recovery Operations, Target Aquifers, and Points-of-Use	5/17	6.8%
22.	Lack of Awareness of the Real Expense of Properly Designed Groundwater Management and Conjunctive Use Programs	5/16	6.4%
23.	TDS Level of Colorado River Water	2/11	4.4%
24.	Current Uses of Existing Facilities May Conflict with the Realization of Conjunctive Use Opportunities	2/9	3.6%
25.	Lack of Consistent Regulatory Approval Process	1/1	0.4%
26.	Long-Term Hydrology vs. Short-Term Weather Events and the Misconception That Engineering Analysis Can Provide Certainty	1/1	0.4%

TABLE 2

All Impediments (26) Ranked by Local Agency Participants (13)

Rank	Title	Times Picked/Pts.	Strength Of Feeling
1.	Inability of Local and Regional Water Governance Entities to Build Trust, Resolve Differences (Internally and Externally), and Share Control	11/93	71.5%
2.	Lack of Sufficient Federal, State, and Regional Financial Incentives to Encourage Groundwater Conjunctive Use to Meet Statewide Water Needs	10/71	54.6%
3.	Lack of Statewide Leadership in the Planning and Development of Conjunctive Use Programs as Part of Comprehensive Resource Planning, and Recognizing Regional and Stakeholders' Interests	9/56	43.1%
4.	Legal Constraints Impede Conjunctive Use Regarding: Storage Rights, Basin Judgements, Area of Origin, Water Rights, and Indemnification	9/56	43.1%
5.	Inability to Match Benefits and Funding Burdens in Ways That Are Acceptable to All Parties, Including Third Parties	7/55	42.3%
6.	Lack of Creativity in Developing Lasting "Win-Win" Conjunctive Use Projects, Agreements and Programs	9/47	36.2%
7.	Supplemental Suppliers and Basin Managers Have Different Roles and Expectations in Relation to Conjunctive Use	7/40	30.8%
8.	Inability to Address: Quality Differences in "Put" vs. "Take"; Standards for Injection, Export, and Reclaimed Water; and Unforeseeable Future Groundwater Degradation	7/39	30.0%
9.	Risk That Water Stored Cannot be Extracted When Needed Because of Infrastructure, Water Quality/Level, Politics, Institutional/Contractual Provisions	8/35	26.9%
10.	Lack of Assurances to Prevent Third-Party Impacts and to Increase Willingness of Local Citizens to Participate	6/27	20.8%
11.	Administrative Constraints Within Programs Resulting in In-Lieu Recharge Limitations, Failure to Maximize Wet-Year Storage, and Conflict in Dry-Year Production	7/25	19.2%
12.	Lack of Market Conditions, Policies and Guidelines for Wheeling Water for Conjunctive Use	3/22	16.9%
13.	Lack of Understanding of the Effect of Recharge and Extraction Within the Basin	3/21	16.2%

Rank	Title	Times Picked/Pts.	Strength Of Feeling
14.	Land Use Zoning Does Not Adequately Address Water Management, Water Contamination, and Recharge Issues	3/18	13.8%
15.	Lack of Clearly Defined Shortage Allocation Plan for Imported Water	5/17	13.1%
16.	Inadequate Understanding of Water Management Among the California Citizenry and Politicians Making It Difficult to Build a Case for Conjunctive Use	5/17	13.1%
17.	Allocation of Regional Water Systems' Costs on the Basis of Annual Water Sales Does Not Provide Incentives to Efficiently Use Supply	4/17	13.1%
18.	Lack of Agreement on Storage Calculation Methods Resulting in Concerns as to Amount of Water Stored, Appropriate Use of Incentives, Value of Incentives	4/16	12.3%
19.	Lack of a Single Entity Overseeing Groundwater Recharge/Recovery Operations, Target Aquifers, and Points-of-Use	4/15	11.5%
20.	Lack of Adequate Surface Water Storage in California to Provide Flexibility to Maximize Conjunctive Use Programs	2/12	9.2%
21.	Lack of Awareness of the Real Expense of Properly Designed Groundwater Management and Conjunctive Use Programs	2/5	3.8%
22.	Current Uses of Existing Facilities May Conflict with the Realization of Conjunctive Use Opportunities	1/4	3/1%
23.	TDS Level of Colorado River Water	1/3	2.3%
24.	Lack of Public Debate/Understanding of What Water as a Commodity vs. as a Public Resource Means	2/3	2.3%

TABLE 3

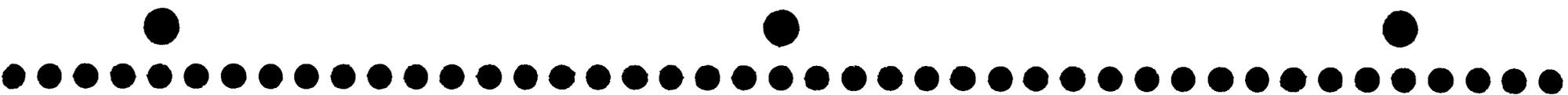
All Impediments (26) Ranked by Regional Agency Participants (5)

Rank	Title	Times Picked/Pts.	Strength Of Feeling
1.	Inability to Match Benefits and Funding Burdens in Ways That Are Acceptable to All Parties, Including Third Parties	5/44	88.0%
2.	Inability of Local and Regional Water Governance Entities to Build Trust, Resolve Differences (Internally and Externally), and Share Control	5/32	64.0%
3.	Inability to Address: Quality Differences in "Put" vs. "Take"; Standards for Injection, Export, and Reclaimed Water; and Unforeseeable Future Groundwater Degradation	4/26	52.0%
4.	Allocation of Regional Water Systems' Costs on the Basis of Annual Water Sales Does Not Provide Incentives to Efficiently Use Supply	4/26	52.0%
5.	Legal Constraints Impede Conjunctive Use Regarding: Storage Rights, Basin Judgements, Area of Origin, Water Rights, and Indemnification	4/23	46.0%
6.	Risk That Water Stored Cannot be Extracted When Needed Because of Infrastructure, Water Quality/Level, Politics, Institutional/Contractual Provisions	3/22	44.0%
7.	Lack of Public Debate/Understanding of What Water as a Commodity vs. as a Public Resource Means	4/20	40.0%
8.	Supplemental Suppliers and Basin Managers Have Different Roles and Expectations in Relation to Conjunctive Use	3/17	34.0%
9.	Lack of Clearly Defined Shortage Allocation Plan for Imported Water	3/13	26.0%
10.	Lack of Sufficient Federal, State, and Regional Financial Incentives to Encourage Groundwater Conjunctive Use to Meet Statewide Water Needs	2/11	22.0%
11.	Lack of Assurances to Prevent Third-Party Impacts and to Increase Willingness of Local Citizens to Participate	2/9	18.0%
12.	TDS Level of Colorado River Water	1/8	16.0%

Rank	Title	Times Picked/Pts.	Strength Of Feeling
13.	Lack of Agreement on Storage Calculation Methods Resulting in Concerns as to Amount of Water Stored, Appropriate Use of Incentives, Value of Incentives	4/7	14.0%
14.	Administrative Constraints Within Programs Resulting in In-Lieu Recharge Limitations, Failure to Maximize Wet-Year Storage, and Conflict in Dry-Year Production	2/6	12.0%
15.	Lack of Market Conditions, Policies and Guidelines for Wheeling Water for Conjunctive Use	1/4	8.0%
16.	Lack of Statewide Leadership in the Planning and Development of Conjunctive Use Programs as Part of Comprehensive Resource Planning, and Recognizing Regional and Stakeholders' Interests	1/3	6.0%
17.	Lack of Awareness of the Real Expense of Properly Designed Groundwater Management and Conjunctive Use Programs	1/3	6.0%
18.	Land Use Zoning Does Not Adequately Address Water Management, Water Contamination, and Recharge Issues	1/1	2.0%

C-015599

146



C-015599

TABLE 4

All Impediments (26) Ranked by State Agency Participants (2)

Rank	Title	Times Picked/Pts.	Strength Of Feeling
1.	Lack of Assurances to Prevent Third-Party Impacts and to Increase Willingness of Local Citizens to Participate	2/18	90.0%
2.	Lack of Statewide Leadership in the Planning and Development of Conjunctive Use Programs as Part of Comprehensive Resource Planning, and Recognizing Regional and Stakeholders' Interests	2/17	85.0%
3.	Inadequate Understanding of Water Management Among the California Citizenry and Politicians Making It Difficult to Build a Case for Conjunctive Use	1/10	50.0%
4.	Inability to Match Benefits and Funding Burdens in Ways That Are Acceptable to All Parties, Including Third Parties	2/9	45.0%
5.	Inability of Local and Regional Water Governance Entities to Build Trust, Resolve Differences (Internally and Externally), and Share Control	1/9	45.0%
6.	Legal Constraints Impede Conjunctive Use Regarding: Storage Rights, Basin Judgements, Area of Origin, Water Rights, and Indemnification	2/9	45.0%
7.	Lack of Public Debate/Understanding of What Water as a Commodity vs. as a Public Resource Means	2/9	45.0%
8.	Lack of Understanding of the Effect of Recharge and Extraction Within the Basin	2/8	40.0%
9.	Lack of Sufficient Federal, State, and Regional Financial Incentives to Encourage Groundwater Conjunctive Use to Meet Statewide Water Needs	1/7	35.0%
10.	Lack of Awareness of the Real Expense of Properly Designed Groundwater Management and Conjunctive Use Programs	1/6	30.0%
11.	Lack of Creativity in Developing Lasting "Win-Win" Conjunctive Use Projects, Agreements and Programs	1/4	20.0%
12.	Land Use Zoning Does Not Adequately Address Water Management, Water Contamination, and Recharge Issues	1/2	10.0%
13.	Inability to Address: Quality Differences in "Put" vs. "Take"; Standards for Injection, Export, and Reclaimed Water; and Unforeseeable Future Groundwater Degradation	1/1	5.0%
14.	Long-Term Hydrology vs. Short-Term Weather Events and the Misconception That Engineering Analysis Can Provide Certainty	1/1	5.0%

TABLE 5

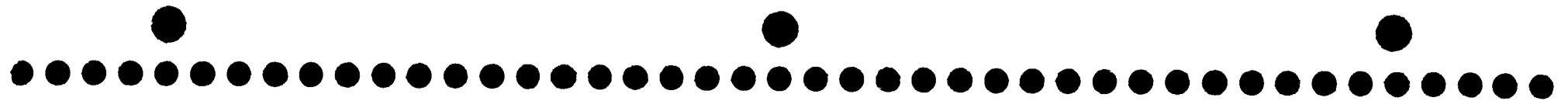
All Impediments (26) Ranked by Private Sector Participants (5)

Rank	Title	Times Picked/Pts.	Strength Of Feeling
1.	Inability of Local and Regional Water Governance Entities to Build Trust, Resolve Differences (Internally and Externally), and Share Control	5/40	80.0%
2.	Lack of Statewide Leadership in the Planning and Development of Conjunctive Use Programs as Part of Comprehensive Resource Planning, and Recognizing Regional and Stakeholders' Interests	4/30	60.0%
3.	Lack of Sufficient Federal, State, and Regional Financial Incentives to Encourage Groundwater Conjunctive Use to Meet Statewide Water Needs	3/28	56.0%
4.	Legal Constraints Impede Conjunctive Use Regarding: Storage Rights, Basin Judgements, Area of Origin, Water Rights, and Indemnification	4/24	48.0%
5.	Inability to Match Benefits and Funding Burdens in Ways That Are Acceptable to All Parties, Including Third Parties	4/18	36.0%
6.	Lack of Creativity in Developing Lasting "Win-Win" Conjunctive Use Projects, Agreements and Programs	3/17	34.0%
7.	Risk That Water Stored Cannot be Extracted When Needed Because of Infrastructure, Water Quality/Level, Politics, Institutional/Contractual Provisions	3/15	30.0%
8.	Inadequate Understanding of Water Management Among the California Citizenry and Politicians Making It Difficult to Build a Case for Conjunctive Use	3/15	30.0%
9.	Lack of Assurances to Prevent Third-Party Impacts and to Increase Willingness of Local Citizens to Participate	2/14	28.0%
10.	Inability to Address: Quality Differences in "Put" vs. "Take"; Standards for Injection, Export, and Reclaimed Water; and Unforeseeable Future Groundwater Degradation	1/11	22.0%
11.	Supplemental Suppliers and Basin Managers Have Different Roles and Expectations in Relation to Conjunctive Use	2/10	20.0%
12.	Allocation of Regional Water Systems' Costs on the Basis of Annual Water Sales Does Not Provide Incentives to Efficiently Use Supply	2/10	20.0%

Rank	Title	Times Picked/Pts.	Strength Of Feeling
13.	Lack of Understanding of the Effect of Recharge and Extraction Within the Basin	2/7	14.0%
14.	Lack of Adequate Surface Water Storage in California to Provide Flexibility to Maximize Conjunctive Use Programs	1/6	12.0%
15.	Lack of Market Conditions, Policies and Guidelines for Wheeling Water for Conjunctive Use	1/5	10.0%
16.	Current Uses of Existing Facilities May Conflict with the Realization of Conjunctive Use Opportunities	1/5	10.0%
17.	Lack of Agreement on Storage Calculation Methods Resulting in Concerns as to Amount of Water Stored, Appropriate Use of Incentives, Value of Incentives	2/4	8.0%
18.	Lack of a Single Entity Overseeing Groundwater Recharge/Recovery Operations, Target Aquifers, and Points-of-Use	1/2	4.0%
19.	Lack of Awareness of the Real Expense of Properly Designed Groundwater Management and Conjunctive Use Programs	1/2	4.0%
20.	Lack of Clearly Defined Shortage Allocation Plan for Imported Water	1/2	4.0%
21.	Lack of Consistent Regulatory Approval Process	1/1	2.0%
22.	Land Use Zoning Does Not Adequately Address Water Management, Water Contamination, and Recharge Issues	1/1	2.0%

C-015603

150



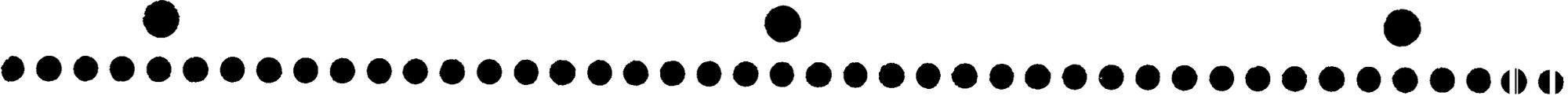
C-015603

APPENDICES

151

C-015604

C-015604



152

C-015605

C-015605

APPENDIX A

GLOSSARY OF ABBREVIATIONS AND ACRONYMS

ACWA	Association of California Water Agencies
AGWA	Association of Ground Water Agencies
CALFED	California-Federal Bay-Delta Program, a cooperative effort by fifteen state and federal agencies with regulatory and management responsibilities in the San Francisco Bay-Sacramento/San Joaquin River Bay-Delta
CEQA	California Environmental Quality Act
CUWA	California Urban Water Agencies
DHS	Department of Health Services (State of California)
DWR	Department of Water Resources (State of California)
EBMUD	East Bay Municipal Utility District
MOU	Memorandum of Understanding
MTBE	methyl tertiary butyl ether
MWD	Metropolitan Water District of Southern California
SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solids
USBR	United States Bureau of Reclamation

APPENDIX B

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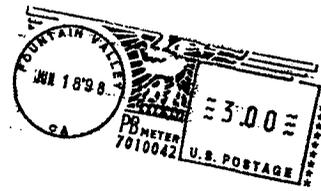
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