Knowledge Management

Workshop Report

Presented by:

National Water Research Institute

January 5-7, 2001

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

Where is the wisdom we have lost in knowledge?
Where is the knowledge we have lost in information?

~T.S. Eliot
Chorus from 'The Rock'

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By

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Foreword

The need for translating and integrating knowledge into the decision-making processes is long-standing, and one that continues into the new century. This need can be traced back to ancient times when a simple Chinese proverb was applied with a brush onto rice paper and read, "The only good is knowledge, and the only evil is ignorance." Many centuries later, T.S. Eliot wrote in "Chorus from *The Rock*":

> Where is the wisdom we have lost in knowledge?
> Where is the knowledge we have lost in information?

The idea for this workshop came from a history of experiences of the principals involved with its planning and execution. The NWRI Research Advisory Board adopted the term "knowledge management" in 1998. The term describes an area that needs to be investigated (i.e., how best to search for and package information and data and then re-package that information and data into a form that decision makers, especially those responsible for public policy, can understand and utilize in supporting their thoughtful decisions).

NWRI was founded in 1991 by a group of southern California water agencies in partnership with the Joan Irvine Smith–Athalie R. Clarke Foundation to create new sources of water through research and technology. NWRI promotes excellence in water research through development of programs and projects with collaborative partnerships with the private and public sectors throughout the United States. Since its inception, NWRI has sponsored over 120 research projects in 14 states, on 22 university campuses, and in 14 utility and/or industrial laboratories. NWRI has invested well over $25 million in water research covering the areas of treatment technology, water quality improvements, and source water protection and assessment.

As part of its research development process, NWRI has utilized the Nominal Group Technique (NGT), which it has refined and modified since 1992, to provide a forum for knowledgeable professionals to gather and deliberate significant water issues. The NGT method is an intensive experience and provides a rich and robust opportunity for participants to explore issues and reach consensus. The focus of this workshop was to address the question: *What specific categories of information are water policy makers having the greatest difficulty accessing, understanding, and integrating into their decisions?*

Part 1 of this document describes the results of the participants assigned to Working Groups to refine the information generated by the NGT element of the workshop. Each group prepared a report of the results of their deliberations from the initial issue identification phase of the NGT process.

Part 2 reports the results of the consensus-building element of the workshop, which culminated in the consolidation of 77 issues identified by the participants. The fact that the participants were able to identify 77 issues demonstrated the significance of the workshop question from their individual perspectives for the need to develop criteria to protect public health.

This document reports the results of the creative efforts of all those who participated in the two-day event. The editorial staff exerted significant effort to maintain the integrity of each participant's contributions.

On behalf of the National Water Research Institute, sincere appreciation is extended to William S. Gaither, Ph.D., who masterfully facilitated the participants through the nominal group process to its final conclusion.

The success of the NGT workshop is in no small part due to the support provided by the professional staff. Special thanks are also extended to the Workshop Editors, Patricia Linsky and Gina Melin; Word Processing Coordinator Tammy Dapkewicz; Joe Pezley, Graphics Coordinator; and his assistant Steve Lyon, who masterfully kept the flow of ideas in front of all the participants.

And a very special and sincere appreciation is extended to the all participants, many of whom traveled considerable distance to attend the workshop and share with everyone their wisdom and experiences.

Ronald B. Linsky
Executive Director
National Water Research Institute

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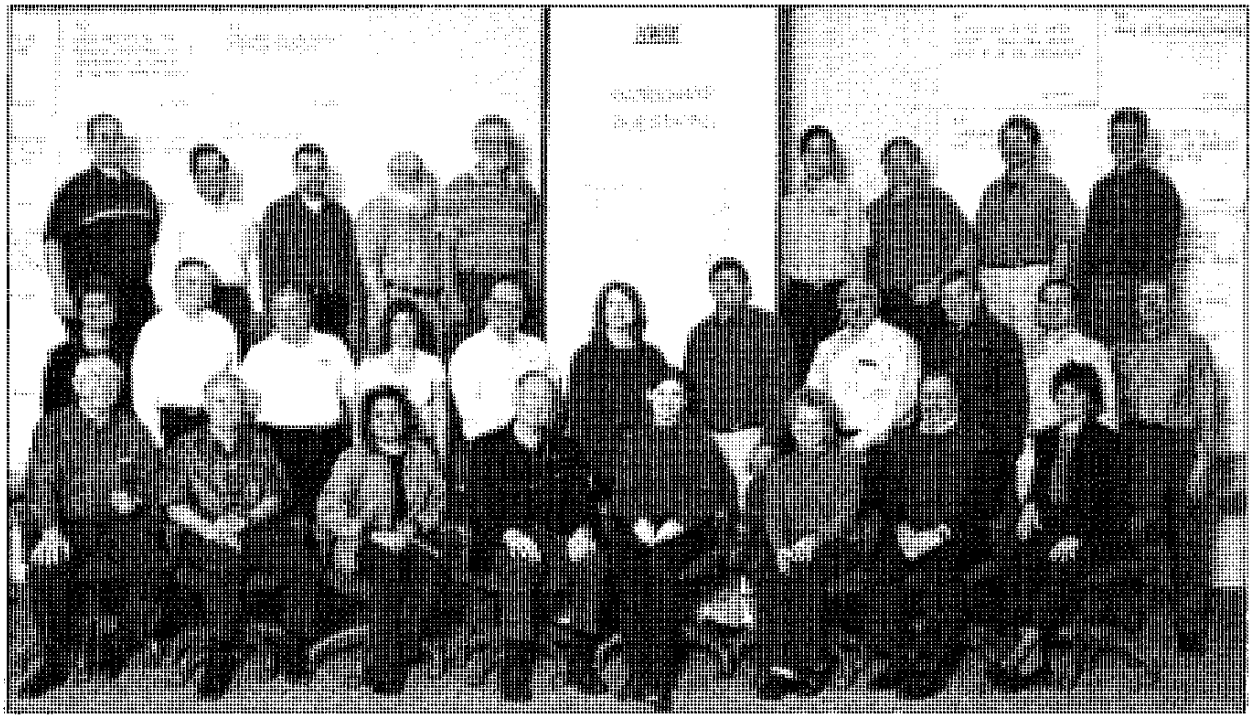
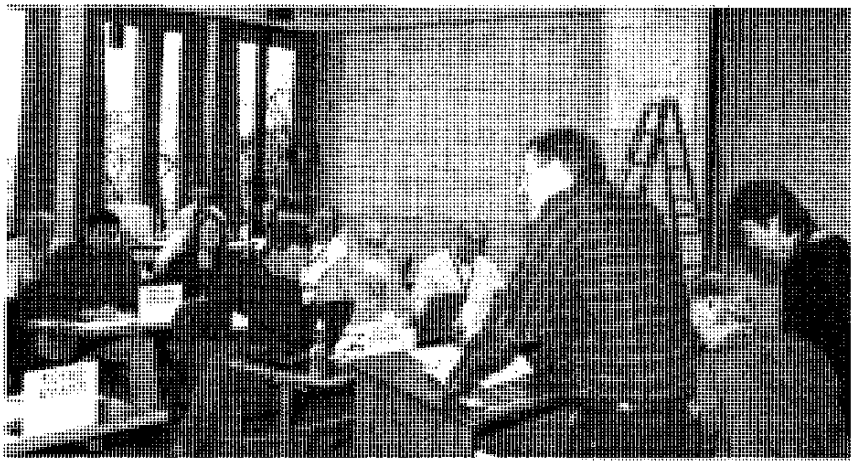
Participants



Top Row: Tim Williams (Word Processor), Thanos Trezos, Basil Sakr (Word Processor), Art Brown, Kelly Rowe, Richard Sakaji, John Withers, Steve Lyon (Graphic Asst.), Bill Blomquist

Standing: Patricia Linsky (Editor), Joe Pezely (Graphics), Paul Kinshella, Tammy Dapkewicz (Meeting Coordinator), Harvey Collins, Cynthia Jones, Williams Goodwin, Gene Schiller, Jim Conklin, Dennis Albiani, Bruce Macler

Seated: Ron Linsky (Secretary), Richard Atwater, Marsha Dansby (Word Processor), Bill Gaither (Facilitator), Gina Melin (Asst. Editor), Mary McDaniel, Jack DeMarco, Mary Ann Dickinson



PART 1

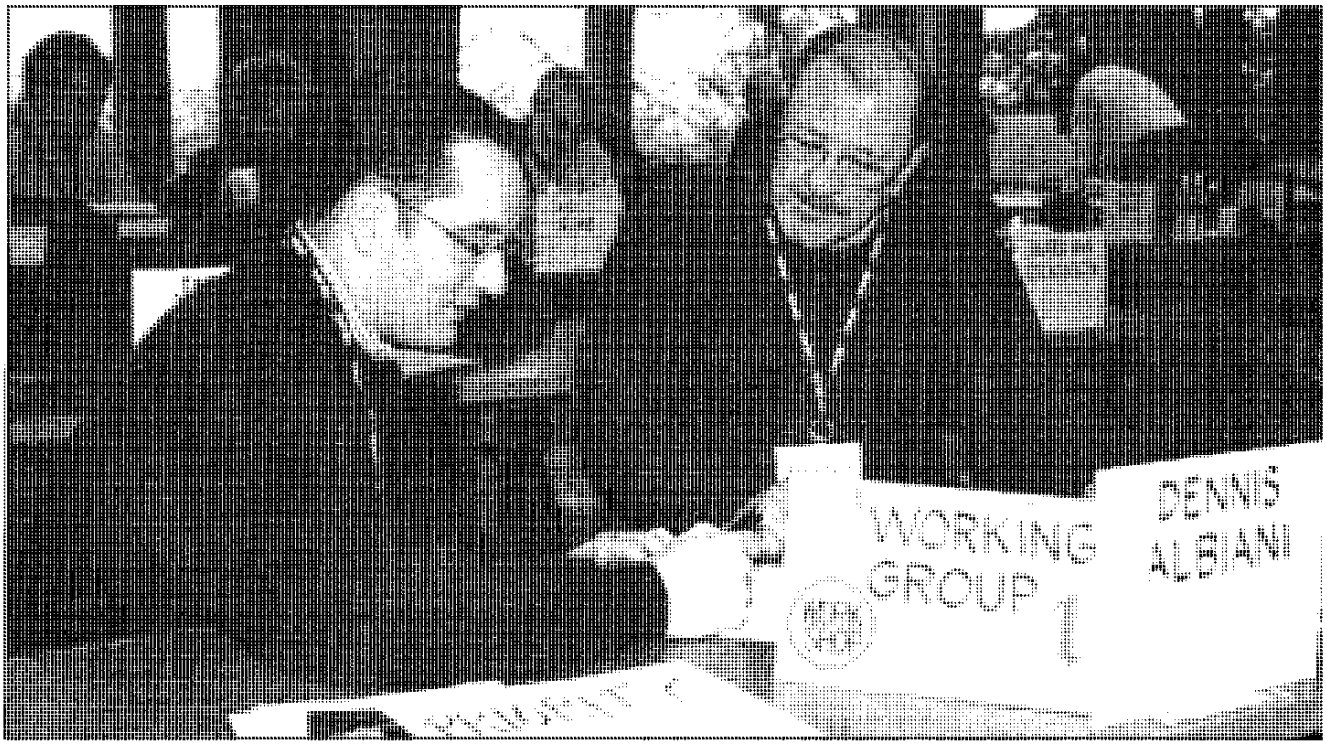
Working Groups' Reports

INTRODUCTION

Summary Descriptions of Highest Priority Categories of Information That Water Policymakers Are Having the Greatest Difficulty Assessing, Understanding, and Integrating Into Their Decisions

Following completion of the Nominal Group Technique (NGT) Workshop, which is presented in Part 2 of this report and the ranking of categories of information by the participants, the 10 highest priority categories were identified and posted on the workroom wall. Working groups were assigned to examine each of the categories of information consolidated under the highest priority categories. The tasks of each of the working groups were to examine, digest, and synthesize the information contained in each of the write-ups from the NGT that had been consolidated under their priority category. Following the process of mental digestion, the working group was expected to write a succinct summary description that incorporated the most salient features of the NGT write-ups included in their assigned information category.

On Sunday morning, all participants re-assembled in the workroom to hear, and discuss, each working group report. Following each working group presentation, all participants were encouraged to submit written comments containing their observations and suggestions about how to improve, or modify, the working group report that they had just heard. Each signed comment is included immediately following each working-group report.


WORKING
GROUP
DENNIS
ALBIANI

PRIORITY 1

Understand Constituents' Needs and Wants and Learn to Operate Within Them While Effectively Altering Them When Necessary

WORKING GROUP MEMBERS:

Albiani and DeMarco

***Description of This Category of Information*:**

Key elements include:

- Get in touch with your constituents.
- Learn what they want.
- Determine what costs (economic and other) they will bear.
- Identify whether there are differences in cultural values within your constituency.
- Learn how to effectively reach these people.

Policy decisions may initially be based on information drawn largely from the scientific and technical community without considering a broader context of social, cultural, and ethical values. Science may dictate action "X." Community values, however, may dictate action "Y."

Populations within any jurisdiction have perceptions about the importance and value of water resources, the integrity and applicability of scientific research, and the efficacy and credibility of government officials and actions. These perceptions overlap to a great degree, but there can also be important differences in perceptions among sub-populations. All too often, the water community neglects to assess what information the consumers' need, in what form, and at what level of sophistication this information needs to be expressed.

How can policy makers be sure that they are interpreting the appropriate scientific and technical information without identifying and understanding the values and needs of constituents? Often, policy makers fail to understand constituents' beliefs, values, and needs. The results are bad decisions being made that are later rejected by constituents. At other times, good decisions are made, but fail when not embraced by constituents. This may result in good decisions not being implemented after substantial resources have been expended.

***Importance*:**

A story about a project must be "received" if it is to be valued and accepted. Money may be spent that does not reflect constituents' concerns. Without a clear-cut assessment of the benefits to constituents, the implementation of needed technology often faces resistance. Gearing explanations to the publics' concerns and level of understanding is sorely needed as an adjunct to consumer confidence reports.

Cultural differences must be understood. If not, they can undermine the effectiveness of public education campaigns, exacerbate mistrust of water policy makers, and, in some cases, even create unanticipated challenges for proposed projects. Any of these undesirable outcomes represent lasting negative impacts on water policy and, therefore, ultimately on public health and safety.

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Implement a comprehensive polling and survey process of the constituents. This effort must identify a community's needs, wants, understanding, and areas of concern. Use experienced professionals with a track record of success. Be sure to have a clear idea of what information is desired and include questions on the best methods of delivering that information.

- Develop criteria for the education of policy makers to explain the realties of demographics and issue identification.

- Use credible spokespersons to deliver messages (e.g., Walter Cronkite, Roger Mudd, Dr. Koop, local newscasters, or activists).

- Develop strategic alliances with professional associations to help deliver your message (e.g., health commissioners, family doctors, and environmental groups).

Recommended Task Group Membership:

- American Water Works Association (AWWA)

- Association of Metropolitan Water Agencies (AMWA)

- American Water Works Research Foundation (AWWARF)

- League of Women Voters

- National Resource Defense Fund

- Professional Public Pollster

- National/State League of Cities
- National Association of Counties
- Association of California Water Agencies (ACWA)
- Water Education Foundation
- National Water Research Institute (NWRI)

***Comments*:**

"Good report. Presenters captured many key elements that were discussed previously." – ***Harvey Collins***

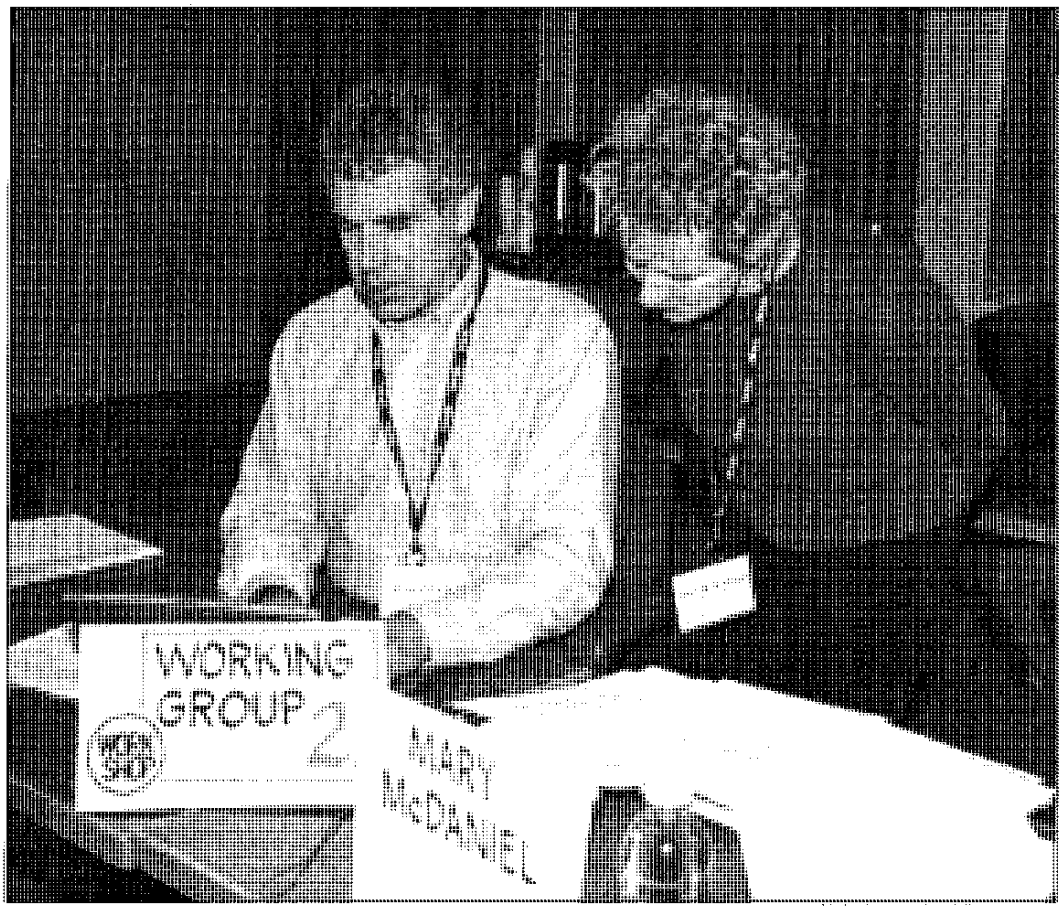
"Whoever acts on this priority should be familiar (or become familiar) with structured audience analysis, and how people tend to receive, understand, and act on information. Communicate from the audience's perspective, not from the expert's perspective." – ***James Conklin***

"Good presentation. Agree with premise. Community involvement is necessary to define acceptable costs and expected benefits." – ***Williams Goodwin***

"I like the idea that dictating to the public is no longer an option. If acceptance is not there, you inquire from the people you want to work with how best to communicate with them. Even when the law is followed, some people will not be informed until the project is in their own backyards. Still, you need to address their concerns." – ***Cynthia Jones***

"This action needs to be ongoing, not a project-by-project basis." – ***Paul Kinshella***

"There may well be different communication vehicles needed for the different audiences outlined here." – ***Mary McDaniel***


WORKING
GROUP 2
MARY
McDANIEL

PRIORITY 2

Public Desire to Determine and Assure the Safety of Their Drinking Water

WORKING GROUP MEMBERS:

Macler and McDaniel

Description of This Category of Information:

Utilities and regulators spend considerable resources to assure safe drinking water, yet many consumers consider it unsafe. This is perhaps because "safe" has been too narrowly defined by those tasked with ensuring water safety. Safe is defined here as a function of both "technical" risk and risk perception (outrage factors). When we base risk management decisions solely on assessments of risk, we are vulnerable to misunderstanding other's needs and concerns for safety. When we assume that we know what is safe without asking for other input, we are bound to make mistakes. We appreciate that one size does not fit all when it comes to water safety. There is no one public point of view. There are a variety of views on what constitutes safe drinking water. All of these views are legitimate and must be accounted for in considering goals for drinking water safety.

The consuming publics' views on water safety are infrequently assessed when determining drinking water standards or other public health criteria for drinking water. There is no general knowledge base on what the various publics consider to be safe. Generally, their views have been ignored or misunderstood.

Congress has made its own attempt to define "safe" as it applies to drinking water. The 1986 amendments to the Safe Drinking Water Act specify the goals for safe drinking water as follows: "the Maximum Contaminant Level goal shall be set at a level of no known or anticipated adverse health effects on persons with an adequate margin of safety." These have been interpreted to mean zero risk. The corresponding National Primary Drinking Water Regulations are to be set as close as "feasible" to this goal. These regulations are to provide safe water. Individual states have also formulated definitions of what constitutes safe drinking water for their residents. These definitions are used in a risk-based format to set drinking water standards. However, these definitions are not well understood and certainly not embraced by all publics. In many areas of the United States, the drinking water is distrusted as unsafe. We feel that a strictly risk-based approach ignores the substantial personal concerns and values built into a sense of "safe". We feel that there is a need to expand these definitions to include input from the various publics.

***Importance*:**

Lack of attention to the full variety of public views can lead to dissatisfaction and distrust of drinking water and its providers. If the water provider's concept of what is safe is different from the consumer's, the perceived risk of consuming drinking water becomes an involuntary (and onerous) risk imposed by the provider and therefore less acceptable.

The mystery of the "black box" of health risk assessment leads the public and policy makers to either blindly trust or distrust the result largely based on the credibility of whoever delivers the result. Those who "believe" in risk assessment are generally unwilling to talk about the assumptions that went into their analysis and are even more unwilling to talk about the uncertainty about the final result.

Another consequence, if the goals are inappropriately defined, is that the approaches and standard setting will be inappropriate, and the resources used to meet these goals may be largely wasted.

How Can This Category of Information Be Better Conveyed to Policy Makers?

The first step has to be to obtain basic information about the publics' views. We recommend that NWRI hold a NGT workshop on the safety of drinking water as a first step in identifying the various considerations of drinking water safety goals and the approaches to achieve those goals.

Some efforts have already been taken to better understand public health goals for safe water. For example, the American Water Works Association Research Foundation (AWWARF) has worked with professional risk communicators and conducted surveys on consumer desires. Individual utilities have likewise conducted consumer surveys. NWRI, in collaboration with AWWARF, Water Environment Research Foundation, and Water Reuse Foundation, is funding research that is expected to be completed this year that probes the public perceptions of reuse and water safety.

Through NWRI publications and other venues we hope this information is widely disseminated.

This information, while somewhat temporal, will still benefit decision makers who so far have had precious little input from the public.

Recommended Task Group Membership

- Mary McDaniel
- Bruce Macler
- Peter Cook
- Troy Hartley

Comments:

"Does the consumer view water as 'unsafe' or do they just always want 'safer'? Surveys show that the public wants 'safer' water, but they also show that the public has confidence in federal regulations and believe that their water is 'safe.'" – ***Dennis Albiani***

"I have some questions about how to communicate safety to the public. If we do not use risk concepts, can we really say water is or is not safe? I think so, but we have to have some criteria upon which to base the decision (statement)." – ***Harvey F. Collins***

"How can the water industry change the public's perception or educate the public as to the relative safety of our water versus any other location in the world. Regain confidence of the public that water quality is something they should not have to worry about." – ***Williams Goodwin***

"If a NGT is conducted on this item, the bottled water industry should be included." – ***Paul Kinshella***

"Semantics is a very important element that must be considered when communicating. Are the terms drinkable, swimmable, and fishable equal or do they compete in the concepts of safe and safety?" – ***Ronald B. Linsky***

PRIORITY 3

Develop Criteria and Clear Communications to Ensure Success of Proposed Projects

WORKING GROUP MEMBERS:

Brown and Collins

Description of This Category of Information:

- Lack of trust; constituents are wary. Trust must be earned over time.
- Technical jargon gets project proponents into trouble. There is need for "common ground" terminology and understanding.
- How rigorous should project approval processes be? They may need to be site specific and must be cognizant of regional and cultural concerns.
- Must anticipate and develop countermeasures for political opposition.
- Information must be succinct and factual. Do not fabricate and do not cover up negatives.
- Do not use euphemisms. Use terms that the audience (public) can understand, i.e., "Call it like it is."
- Expect the unexpected. Be prepared in advance with information packets but be flexible so that additional information can be provided quickly.
- Access, try and understand, and integrate information regarding public opinion into the planning and education processes.
- The public must be convinced that the process is fair – that their voices have been heard. If they believe that the process is fair, they are much more inclined to accept decisions with which they disagree.

***Importance*:**

- Projects can fail due to poor planning and underestimating the opposition.
- Policy makers must ensure that all bases have been covered – no surprises during public hearings.
- The public has a basic distrust of science and technology. This can only be overcome by creating trust (i.e., educational booklets, local citizens advisory committees, etc.). Communicate with all people who are concerned.
- Negative perceptions, which are held by the public, must be overcome or the projects may fail.
- If the opposition is purely political, then it must be dealt with via the political process. Technical responses to politically motivated questions will be of no value.
- If agencies hide behind euphemisms and acronyms, the public will feel that those agencies are trying to hide the truth.
- If agencies do not speak with one voice and develop consensus, good projects may fail.
- If policy makers have to guess at public opinion, they run risks of making at least two public mistakes. First, and most obvious, is misjudging public concerns, and either missing opportunities to develop and protect water resources in ways that would have public support, or wasting valuable resources on decisions and actions that end up colliding with unforeseen opposition. Second is not recognizing whether, when, and how to exercise some leadership in the formation of public opinion.

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Educate policy makers via training seminars, booklets, etc.
- Use the news media to educate the policy makers, as well as the public.
- Provide policy makers with examples of good ideas that were poorly presented and resulted in failed projects.
- Illustrate that the planning process will vary from project to project. This should be illustrated by the use of case study evaluations.
- Present successful case examples.

- Use state and national conferences to convey this information and make sure that policy makers are invited. Manuals should be developed that discuss best management practices, resource costs, and leveraging campaigns.

- Create and convey strategic visions within the local community.

Recommended Task Group Membership:

Water works organizations, such as:

- Water Education Foundation

- American Water Works Association Research Foundation

- U.S. Environmental Protection Agency

- U.S. Bureau of Reclamation

- U.S. Army Corps of Engineers, Water Resources Institute

- Water Resources Research Centers in all 50 states

***Comments*:**

"Hire good staff! Good staff will assist in developing good communication, building bridges, and hiring good consultants." – ***Dennis Albiani***

"If we are interested in sound science, why are we so devoted to 'assuring the success of proposed projects'? Also, how do we assure the public that a process is fair and their voices will be heard, if we've arranged the process with the goal in mind of assuring the success of the proposed project?" – ***William Blomquist***

"Not only must we convince the public that the process is fair, policy makers themselves, and their support groups, must be convinced that their process is fair." – ***James Conklin***

"Good presentation." – ***Williams Goodwin***

"Distance: People who you want to receive information/data must be in close proximity to the issues at hand. People relate to the issues that are 'geographically close.' Interest in a project is directly proportional to the distance between the project and the viewer." – ***Ronald Linsky***

"Use modern terms that the public can understand. Continue to work to develop finite terms for recycled water, Title 22, reverse osmosis, etc." – ***Cynthia Jones***

"One of the most important determinants of whether an individual is viewed as trusted and credible is whether the person is seen as empathetic and concerned. Having the 'technical' answer alone is not enough. Until that invisible bond with an audience is established, the engineers are just moving their lips." – ***Mary McDaniel***

PRIORITY 4

Scientific, Technical, and Financial/Economic Information – The Value of Which Is Directly Proportional to the Quality (Including Uncertainty) of the Data

WORKING GROUP MEMBERS:

Conklin and Sakaji

Description of This Category of Information:

Any decision-making process will only be as good as the information used to justify the decision. Risk managers are required to judge the quality of information used in developing or setting water policy. The fact is that no policy will be any better than the least reliable piece of information on which the policy is based.

In addition to the uneven quality of existing information, another weakness that currently besets the policy making process is that **the information on which decisions are based is never likely to be "perfect"** (fully complete, covering every possible objection, or answering every feasible question), and there will almost always be some "unknowns" that must be identified and handled in the formation of policies. The ability to clearly identify these uncertainties and unknowns can influence the quality of the policy-making decision, but today these uncertainties and unknowns are only loosely factored into the decision-making process or hidden in ill-defined terminology. Apparent incongruities and inconsistencies between policies may be traced to the influence of unknowns and uncertainties in the technical data on which policy decisions are based and the relative reference points from which the policy is derived.

Information is not only of uneven quality – it is also often inconsistent. For example, vocal project opponents frequently hire their own experts to counter the opinions of scientists and engineers in industry and government who support the project. By questioning the safety of a project on the basis of data that is of poor quality or dubious integrity (i.e., the proposed Auburn Dam is near an earthquake fault; the proposed Ward Valley Low Level Radioactive Waste Site will contaminate the Colorado River; and the San Diego Water Purification Project is unsafe... "Toilet to Tap"), doubts are planted in the minds of consumers, the public, and policy makers. Thus the question, "How can we know the project is safe when the experts disagree?"

A significant and common example of the difficulty that policy makers experience in interpreting scientific and technical information can be found in drinking water analysis. For example,

information on drinking water contamination and contaminant health effects is often misunderstood and frequently miscommunicated in public discussions. Health data and risk assessments are often mistaken as the same, while in reality they should be treated as distinct and separate types of analysis. Uncertainties, data gaps, and unknowns are not appropriately identified, used, and discussed.

These problems and challenges are compounded when one realizes that **the public is often trying to interpret and form opinions on the basis of the same information that policy makers are using.** The implication is that policy makers are struggling to interpret and act on complex, opaque scientific and technical information, and the public is simultaneously interpreting – and perhaps drawing erroneous conclusions from – the same body of information. Beset by complexity on the one hand and confusion on the other, policy makers have few places to turn for clarity and solid, reliable information.

For example, recent surveys of the public in the Los Angeles, Phoenix, and Tucson areas indicate that the public has little more than a rudimentary knowledge about water and water quality, and they do not know who to trust. Water engineers, universities, and the county health agency are above average in holding the public trust. The newspapers, United States Environmental Protection Agency (U.S. EPA), and city council are below average in holding the public trust.

The public does not have a good source of reliable information, and **this results in public opinion being susceptible to emotional appeals.** Two or three determined and persuasive people can mobilize the masses against a project. The real motive of these people may not be associated with the arguments they are making. They may use good information or misinformation in getting the public to support their cause.

In sum, the quality of information used by policy makers is often suspect. This problem not only directly affects the policy makers themselves, but also introduces confusion into more general public debate on water issues.

***Importance*:**

In nearly every case, policy makers must make decisions on the basis of an incomplete body of information. Today, the information at hand is too often difficult to find, understand, and use; moreover, there is no clear, uniform way for policy makers to acknowledge and respond to uncertainties and unknowns. This introduces serious problems into the policy-making process.

The uneven quality of information gives rise to several issues. Clearly, one needs to view environmental and public health problems/issues as being in a constant state of flux. As research is conducted, a clearer picture develops, but the need for policy often comes at a time when critical information is lacking. Hence, policy development requires the exercise of good judgment grounded in technical fact – not action based on a "perfect" background briefing report.

Erroneous information is as bad, or worse, than the lack of information. Policy makers must "know their source" when evaluating technical information submitted in support of, or opposition to, a project. Without knowing who the experts are, decision makers will lack confidence, giving less qualified experts a disproportionate voice.

To alleviate these concerns, policy makers need to be able to identify the recognized experts, in the United States and abroad, on specific water-related issues, and how to reach them and access their knowledge. This, in fact, is one of the basic questions that plague knowledge management professionals.

Research into collaboration and knowledge sharing shows that people share information with those with whom they have an actual, trusting relationship. Relationships, not technology, are the "highways" or "pipelines" along which knowledge flows. Culture and knowledge hoarding are often the biggest barriers to knowledge sharing. A prerequisite to obtaining high-quality, consistent information, then, is to ensure that the water policy-making community has the relationships and attitudes that lend themselves to sharing knowledge.

If locating experts willing to share their knowledge is a prerequisite to obtaining reliable, consistent information, then the challenge of interpreting the information supplied by these experts gives rise to additional issues. What, for public policy purposes, is the essential meaning and the most significant implications of the technology or science described in research reports? How do we move new technology from the laboratory and into the community? How will the public feel about this? Should we act, engage in further study and validation, or dismiss this as a dead-end? To answer these questions, policy makers must extract, from enormous volumes of scientific data and from the impenetrable prose of most "official" and scientific discourse, the concise meanings they need in order to make effective, inclusive, and robust policy.

When faced with poorly described information, decision makers may ignore the information completely, assume the worst, or inappropriately use the information to justify decisions based on other criteria. For example, the mystery of the risk assessment "black box" leads the public and policy makers to either blindly trust or distrust the result largely based on the credibility of whoever delivers the result. Moreover, those who "believe" a risk assessment are often unwilling to explicitly identify the assumptions and the uncertainties of the final results.

How Can This Category of Information Be Better Conveyed to Policy Makers?

One cannot convey information to policy makers, environmentalists, scientists, engineers, or the general public at large if they won't listen. It is imperative that we *re-establish* trust. As an example, many politicians do not trust government engineers or scientists, but view them as bureaucrats. Because of this lack of trust, they look frequently to environmental groups for their scientific and technical information. This must be changed, and perhaps the best way to start is in our grade schools.

Other actions could include:

- Let the media help.
- Educate public figures.
- Lobby governmental agencies to make research findings available.
- "Yellow pages" of experts conducting research in the field.
- Knowledge map.
- Conferences and gatherings.
- Annotated bibliography.
- Define reporting requirements, with additional rigor, by those who fund research.
- Create a national web-based vehicle to interpret and disseminate information.
- Conduct web-based conferences or discussion threads to clarify and summarize technical information.
- Establish a protocol for trading-off unknowns and uncertainties given specific goals and constraints.

Recommended Task Group Membership:

Actions	Who Can Help
Re-establish trust	Water Education Foundation
Let the media help	NWRI, Water Education Foundation
Educate public figures	National Academy of Sciences
Lobby governmental agencies to make research findings available	All stakeholders
"Yellow pages" of experts conducting research in the field	National Academy of Sciences
Knowledge map	National Academy of Sciences
Conferences and gatherings	NWRI, American Waterworks Association, Assoc. of California Water Agencies
Annotated bibliography	NWRI, EPA, AWWARF, WERF
Define reporting requirements, with additional rigor, by those who fund research.	Research Agencies – e.g., EPA, AWWARF, etc.
Create a national web-based vehicle to interpret and disseminate information.	EPA, AWWA, WERF
Conduct web-based conferences or discussion threads to clarify and summarize technical information.	NWRI (to further define)
Establish a protocol for trading-off unknowns and uncertainties given specific goals and constraints.	Charles Haas at Drexel University EOA, Inc. (Oakland CA) International Life Sciences Institute (ILSI)

Comments:

"Trust. Build education/grade school; Water Education Foundation (WEF); National Water Research Institute (NWRI); National Research Council (NRC)/National Academy of Sciences (NAS). Integrating and coordination of scientific and technical information is a credible/authoritative format that can be communicated to the policy makers and the public." – ***Richard Atwater***

"Great report. The interpretation of presentations will, indeed, depend on the credibility of the presenter. The bias of the 'receiver' – proponents as well as opponents – will, no doubt, influence what they 'think they heard.'" – ***Harvey Collins***

"Title is very cumbersome. Can it be simplified to express the concept without the jargon? It needs to better represent the importance of the topic." – ***Mary Ann Dickinson***

"We must recognize and address the basic conundrum. On one hand, the scientific community – and the public – believes that if enough research is done, and done carefully, a single 'correct' answer will emerge. On the other hand, the public is accustomed to the adversarial legal process where well-made opposing arguments result in the 'truth.' As a result, the scientific community is 'entrained' in the adversarial legal process. This confuses the media, the public and, particularly, kids. The only group not confused is the lawyers, but they only care if they win, not what is best for society." – ***William Gaither***

"Creation of a controlled internet clearing house. Peer review of information is necessary prior to inclusion of the page. Must meet criteria of scientific, medical, or engineering protocols to be 'published.'" – ***Williams Goodwin***

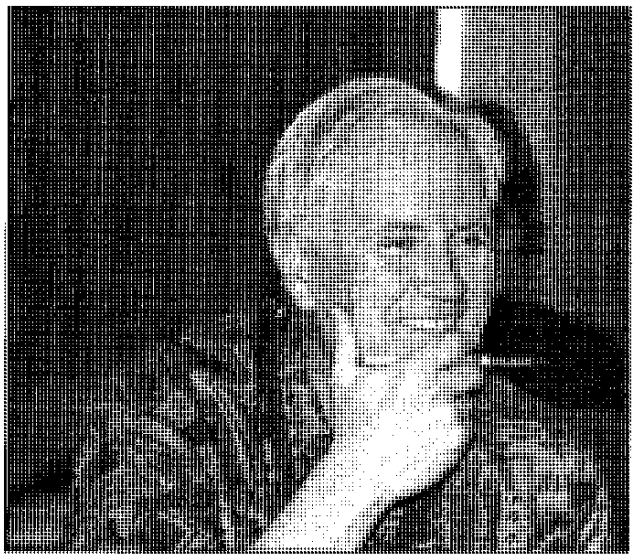
"Complexity versus confusion. Very good description of the results when two different groups use the same information with different perspectives. Where is the recommendation for uniform modern descriptions? Science needs to work with the public and politicians to help create uniform, understandable language." – ***Cynthia Jones***

"Add to 'How Can…' List: Identify resources and emphasize the provision of adequate (usually additional) time to produce better-quality information products." – ***Bruce Macler***

"While it is certainly true that all experts are not created equal, it is difficult for policy makers to decide whose credentials pass muster. Is it feasible to create some version of a water community 'Good Housekeeping Seal of Approval' that would help the public and policy makers have a better idea of the scientific credibility of any given 'expert'?" – ***Mary McDaniel***

"Need to summarize in **highlighted bullets** for less technical readers. Great comprehensive statement!" – ***Eugene Schiller***

"Shorten the title. Demonstrate the universal applicability of the subject by drawing from other ones (e.g., health care, marketing, engineering, etc.)." – ***Thanos Trezos***



PRIORITY 5

Current and Historical Information About What Others Are Doing to Solve Water Problems

WORKING GROUP MEMBER:

Atwater

Description of This Category of Information:

The difficulty here is accessing information, rather than understanding it. Water policy makers at any level of government are, of course, aware of their own water challenges and their efforts to meet them, but they often toil in ignorance of what others are doing, or have done, to meet the same challenges. This is probably not due to the lack of information that are available, but to the difficulty in finding relevant information with minimal expenditure of time and effort.

The constant challenge is to update and incorporate relevant experiences from others, including water problem-solving experiences, treatment data, analytical tools, creative financing approaches, and innovative institutional implementation techniques. As new data and experience become available, we need to learn from that base of knowledge to avoid "reinventing the wheel" over and over again. Decisions on water resources management should be shared with others having similar problems in order to expand the knowledge base and improve policymaking.

Achieving knowledge, project experience, and institutional expertise on water resource problem-solving strategies are important objectives. Policy makers need to be able to readily access this wealth of knowledge in a user-friendly information system.

Importance:

Water policy makers who lack information about what others are doing labor under at least two major difficulties that can produce significant errors or losses. The first, and most obvious difficulty, is missing vital information about lessons learned elsewhere thereby expending valuable resources and unnecessarily repeating those learning processes. The second, and probably less damaging difficulty, is that water policy makers in a particular community or region, may be deluded into thinking that they are "the first," or breaking new ground, on some activity or project, when in fact they are not.

In addition, a lot of expertise and resources is wasted on duplication and redundant research and application of solution strategies to a specific water problem. Technology development and creative management approaches to solving water problems are being rapidly explored on an international scale. Integration and coordination are possible with the Internet, but there is no clearinghouse or repository that a policy maker can go to easily for complete and comprehensive background data on a similar water problem or issue. Easy access to data will allow policy makers to validate or benchmark their decisions to ensure their proposed solution is cost effective and will work.

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Electronic or other clearinghouses in accessible format and language – briefings, newsletters, workshops. Push technology newsletters and easily accessible websites that invite laypersons' use. Documentation of case studies into a format for policy makers to learn from other experiences to similar problems would be very useful.

- Symposia, conferences, and audio-video training materials.

- Benchmarking reports on "best in class" and other comparisons are very useful for layman policy makers.

- The Association of California Water Agencies (ACWA), for example, has a handbook "Public Agency Officials' Complete Source Book" and offers annual seminars and workshops for elected officials and managers regarding finance, regulatory issues, legislation, new health risk issues, etc.

- Similarly, the California Association of Sanitation Agencies (CASA) provides similar programs. Other associations, of course, would include national organizations: AWWA, WEF, AMSA, and AMWA.

However, the key point is that senior managers, and in particular elected officials (or appointed board members), need access to clear, concise, and easily understandable information to ensure that their decisions are based upon comparable knowledge for similar water problems. Specific resources and technology transfer programs to ensure that policy makers can easily retrieve and use this knowledge and information base is the focus of this recommendation.

NWRI should organize and fund expert panels (Urban Land Institute design charrettes) for 2-3 day workshops (may be NGT format) to recommend strategies for a specific policy maker problem or issue.

Recommended Task Group Membership:

- Bill Blomquist
- Mary Ann Dickinson
- John Withers
- Kelly Rowe
- Harvey Collins
- Rich Atwater

Comments:

"Good 'nuts and bolts' report. Would provide useful tools for policy makers, if funds can be made available to implement recommendations." – ***Harvey F. Collins***

"For the web-based case study resource, make sure that the design and development are based primarily on the content, not on technology or graphics. The site must be usable by the intended audience(s), and this must underlie the design. Research audience need: design easy-to-use site with excellent content. Without excellent content, people won't use it." – ***James Conklin***

"Good presentation. There should be peer review of information on a web page for quality, clarity, filtering to appropriate content." – ***Williams Goodwin***

"Suggest a new title, 'Developing Case Studies and Resources.' Consider adding the category of information found in Priority 14 of the NGT section of this report into this priority. The category of information contains exactly the type of case study referred to today – seawater desalination and identification of risk factors to be mitigated by stakeholders." – ***Eugene A. Schiller***

PRIORITY 6

The Valuation of Water As an Asset

WORKING GROUP MEMBERS:

Blomquist and Trezos

Description of This Category of Information:

Water is a limited resource. It is consumed for multiple and, sometimes, competing beneficial uses. Water of sufficient quality for human consumption is even more limited.

Water has value not only as a commodity, but also as an asset that provides multiple benefits to a community. Its non-consumptive uses – of which there are many, from aquatic habitat to hydropower – are among those benefits. Some of those non-consumptive uses have easily recognizable monetary values while others do not, and even the non-consumptive uses compete with one another.

Consequently, not only policy makers but researchers and consultants have difficulty understanding how to describe and quantify the value of water. The valuation process itself is a category of information that policy makers have difficulty grasping and applying, in large measure because there are few, if any, good models from research to use. Apart from the endlessly repeated Ben Franklin aphorism that "When the well runs dry, we know the worth of water," in virtually all other circumstances, we don't.

The type of valuation activity water policy makers are most familiar with is rate setting. This is a sub-optimal approximation of valuing water as an asset for two reasons. First, rate setting is typically performed only for those uses of water that can be readily monetized, which are a very small subset of the beneficial uses that have value.

Second, even among those uses for which rates are established, the rate-setting process has drawbacks. In most cases, water rates in the United States are established through a process that combines a cost basis (how much money is required to get the water to the consumers) with political constraints (how much money are the consumers willing to part with). Furthermore, because of the fragmented structure of the water supply industry in the United States, municipal and other local officials who have to set retail water rates often have to do so with limited or late information about suppliers' wholesale rates and plans.

Beyond rate setting, little is known by water policy makers about how to assess water as a resource rather than simply as a commodity. As a result, uses of water that cannot be translated into water rates may be misperceived as valueless.

Importance:

Jurisdictions that do not know how to evaluate water as an asset have a much harder (perhaps impossible) time making sound decisions about whether and how to invest in its development and protection. There may be over-investments in projects that exploit comparatively "cheap" water supplies. There may be under-investments in projects or programs that would protect water sources or develop newer and more sustainable ones. In the absence of better methods of valuing water, we simply do not know whether, and to what extent, excessive or insufficient investments are being made.

If valuation is confined to market forces, then non-monetary beneficial uses of water will almost certainly be eliminated. For example, in the context of the current California power-generation crisis, the electric power industry would be willing to pay far more for the additional water than fishermen or boaters or other recreational users could hope to afford. Therefore, a narrow economic logic would wipe out recreational uses in favor of additional power generation.

A real challenge lies in finding ways to include and balance non-consumptive and non-monetized uses of water in the same decision process with consumptive and monetized ones. Currently, there are few, if any, good models of how this can be done.

Failure to value water as an asset also underlies and reinforces the problematic system of water rights in California and elsewhere. That system lacks accurate reflections of real water needs and the ability to reallocate water across competing uses.

Policy makers who have not been able to value water as an asset are also at a significant disadvantage in communicating with their constituents about the benefits their community, region, or nation will experience as a result of investing in water resource development or protection.

How Can This Category of Information Be Better Conveyed to Policy Makers?

NWRI and others should go beyond promoting the importance of valuing water, and support some demonstration research projects that would develop and apply valuation methods in real settings, to provide some examples for wider use.

In particular, the concepts advocated in NWRI's publication, *The Value of Water*, should be applied in the context of one or more actual communities. For example, *The Value of Water* advises officials "to identify both recognized and unrecognized assets." While some categories of examples are provided in the booklet, a useful next step would be to aid a community in actually performing that asset identification in the real context of their own situation.

As the *Value of Water* also recommends, these steps should take place with the input of people from outside the traditional water supply community. Especially with respect to the issue of competing uses of water, we need to have more public involvement in learning about the *value* of water versus the *cost* of water.

In addition to conceptual-level work on valuation of water in competing uses, some empirical research could be conducted on current practices. One such possibility is a comparative survey of a sample of locations in the United States to assess how water in competing uses is currently being allocated and valued.

Another possibility is an adaptive management/pricing approach to water valuation. It could involve a given allocation of water supplies across categories of use, allowing market forces to signal water values within categories, followed by an assessment of effects across categories and possible reallocation, followed by another reassessment, etc., in iterative fashion.

Other possible improvements, limited to the rate setting aspect of water valuation, might involve closer cooperation among wholesale and retail water supplies concerning the scheduling and the information base for rate adjustments.

Recommended Task Group Membership:

Multi-disciplinary task force:

- Academics and consultants from the field of economics, ecology, finance, and management (Steve Light, Sandra Archibald, Charles Abdalla, Kris Lindstrom).
- Practitioners from the water supply and water regulatory community (Paul Reiter, Eugene Schiller).
- Representatives from household consumers, business consumers, recreational users, etc.
- Local governments.
- Elected officials.

Comments:

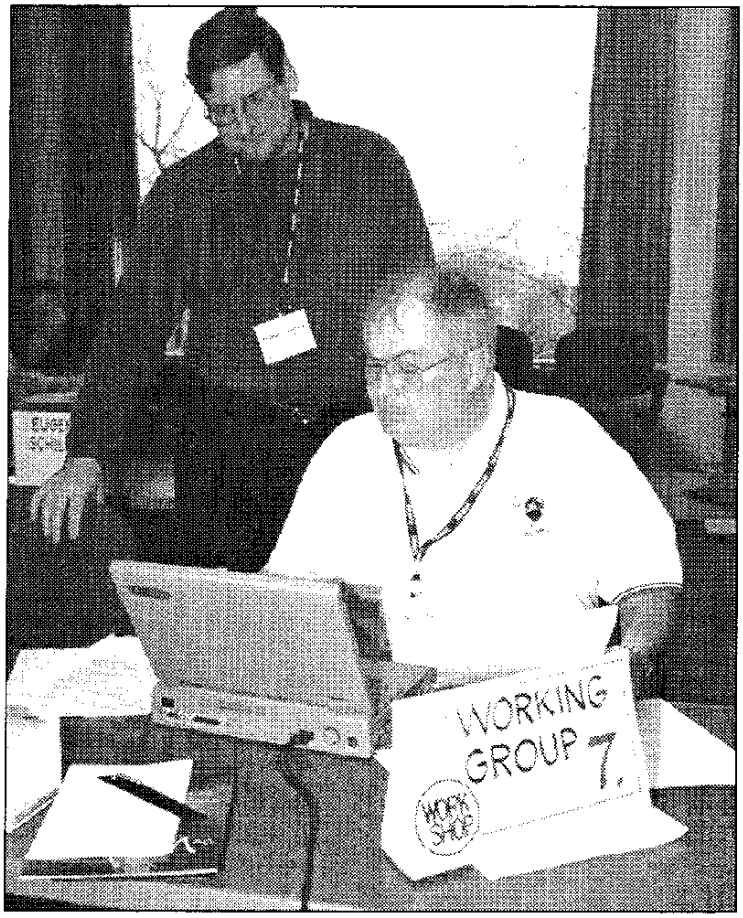
"Good report. Water is grossly under-evaluated. I suspect that the only way to change this is to change public viewpoints. This will require a long, extensive process." – ***Harvey F. Collins***

"The emphasis here seems to be on the need to create usable knowledge about water valuation – researching and reporting. Perhaps this could be linked to Priority 5. Priority 6 creates valuation knowledge while Priority 5 creates a framework for sharing this knowledge." – ***James Conklin***

"Task Force suggestions: David Mitchell; George Raftelis; and Tom Chesnutt. I have their contact info and qualifications." – ***Mary Ann Dickinson***

"How can we find out about other efforts that have addressed this issue?" – ***Williams Goodwin***

"A very prescriptive presentation with far-reaching global implications. Thank you!" – ***Cynthia Jones***



PRIORITY 7

Appropriate Technology to Invest in Today to Meet Tomorrow's Regulations

WORKING GROUP MEMBERS:

Goodwin and Kinshella

Description of This Category of Information:

Major infrastructure investments are being made to provide additional water supplies for a growing population and to bring existing supplies to current water-quality standards. Some level of confidence is needed that the technology of today will meet the regulatory requirements of tomorrow.

Federal regulations dealing with major items, such as disinfection resistant organisms, lead concentrations in tap water, radon, etc., present a major set of infrastructure decisions for water policy makers. Questions relating to optimal methods for coping with various contaminants singularly, or as a large coordinated threat to the public, pose puzzling choices. The unknown of future requirements complicates the decision process. What are the risk/benefit conditions and knowledge base that currently exist? What can we anticipate in the future?

Regulations are promulgated on the basis that there is a reasonably cost-effective technology available to meet the regulatory requirements. Often times (or most times), the efficacy of technology is not universally tested, yet it is the basis for defending regulations that cost millions or billions of dollars to the general public – the fount of all dollars. A process should be put in place to fund demonstration projects to test technologies prior to moving forward with new regulations.

The traditional approach to maintaining and ensuring the delivery of potable water has been to establish multiple barriers between the source and the consumer. These barriers can be placed in the watershed, in the treatment system, or in the distribution system. Each of the barriers can be considered a control point, and the redundancy provides a level of comfort that the system will meet future regulations as well. In theory, any reduction in the strength of one would have to be offset by an increase in the strength of other barriers. However, there is greater pressure to develop in the watersheds and to lower disinfectant residuals to meet the growing demands on the system, placing a greater reliance on treatment. To prepare for the future, we must ask:

- How good is each of the barriers?
- How does constructing process trains impact the overall performance of the barriers?
- What treatment units (barriers) should not be placed in front of the other?
- What additional barriers may be needed in the future and how can we design our current system to accommodate them?

Appropriate technology addresses the potential for system failures through redundancy, but the system is not foolproof. The public appreciates knowing that the purveyor of a particular technology has considered the risks and developed appropriate contingency plans. In case of failure, immediate public disclosure is prudent both for health and safety and to maintain credibility. Prognosis of system restoration should be communicated.

Technological research should include more than just treatment. Increasing treatment requirements are resulting in improved water quality, but we need to develop a better understanding of how our aging distribution systems influence quality at the tap. As regulations move toward measurement at the tap, we may find surprises we will not like.

Importance:

Communities are currently faced with investment decisions to bring their water supplies to current standards. The investment required to meet future standards will be even greater. With competing high priority needs for public money, the technology to meet water qualtiy standards must be cost effective today, and into the future, while providing an adequate benefit for the term of the investment.

The lack of multi-contaminant solutions to meet water quality standards tends to cause a great deal of reluctance by policy makers to implement needed technological improvements.

Requirements for lead concentration reduction, reduced microbial contaminant counts, and reduced disinfection byproduct levels cause increased implementation costs. This creates a reluctance to comply with new Federal requirements until the last possible moment (i.e., what will the new contaminant candidate listing be?). The next new water quality standard may require a different technology than the one just installed to meet the last new water quality requirement.

The lack of information for specific utilities in the rule making process may mean that a technology is implemented that will NOT achieve the desired results, yet considerable public monies may be expended. Such white elephants are catastrophic in maintaining credibility of the policy makers. The federal and state regulators do NOT share the blame for such problems and loss of confidence in local policy makers.

Capital programs to meet new regulatory requirements take years to implement and millions of dollars. The reduction of upstream barriers or their elimination could make costly improvements ineffective in meeting their design expectations. The parties responsible for the upstream actions would have no requirement to offset the downstream costs.

With the complex projects required to meet new rules and standards, mistakes will be made. Admission of the potential for system failure increases credibility— a concept that is counter intuitive for many policy makers and executives. The general public may not have lots of technical expertise, but they are experts on the potential for human error.

In addition to water quality improvement requirements, the existing distribution system may be the next problem. Millions of miles of distribution pipe exist, along with many distributions storage tanks. These systems are relied upon to maintain water quality to the consumer's final use. No one truly knows how to design these distribution systems other than to meet domestic and fire demands. New design standards need to be developed to provide for the maintenance of water quality in the system.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Sharing of information is the cornerstone of improvements in regulatory policy decisions, which will increase our confidence that current investments will be appropriate for the future. Some ideas for improving this dialogue are to:

- Create a database of current solutions to various problems, including actual cost/benefit.
- Invest in multipurpose demonstration projects funded by the federal government with results widely disseminated and assimilated.
- Develop a fault-tree analysis process for each unit process and overall treatment train.
- Not allow regulation at the tap until we understand what problems may exist with the current system.
- Base regulatory decisions on a balanced scientific viewpoint, and not on emotional reactions.
- Expand the discussion of "layers-of-protection" on the front end to include what can go wrong on the back end. The public and policy makers want to know that the agency is considering the "what if's" and has a back-up plan.

An example of an appropriate process is as follows:

A number of utilities have coordinated research that places the efficacy of a given unit process in perspective. Examples include quantitative measures of:

- Ozone results for *Cryptosporidum* inactivation.
- Concentration x Contact Time tables for disinfection.
- Attempts to conduct multi-utility lead-service-branch projects for the remediation of lead in furnished tap water.
- Multi-city ultraviolet studies in parallel conducted with the same protocols. This type of presentation is meant to provide measures of the range of effectiveness of various methods. Peer reviews of these findings will be the baseline for regulatory discussions.

Recommended Task Group Membership:

- National Water Research Institute – Nominal Group Technique Workshop
- American Water Works Association Research Foundation
- Water Environment Research Foundation
- Water Reuse Association/Foundation
- Universities
- Rick Sakaji
- Jack DeMarco
- Mary McDaniel
- Bill Goodwin
- Paul Kinshella
- Dick Howitt
- Marca Weinberg

Comments:

"Good report. I like the idea of demonstration projects to test new technology." – ***Harvey F. Collins***

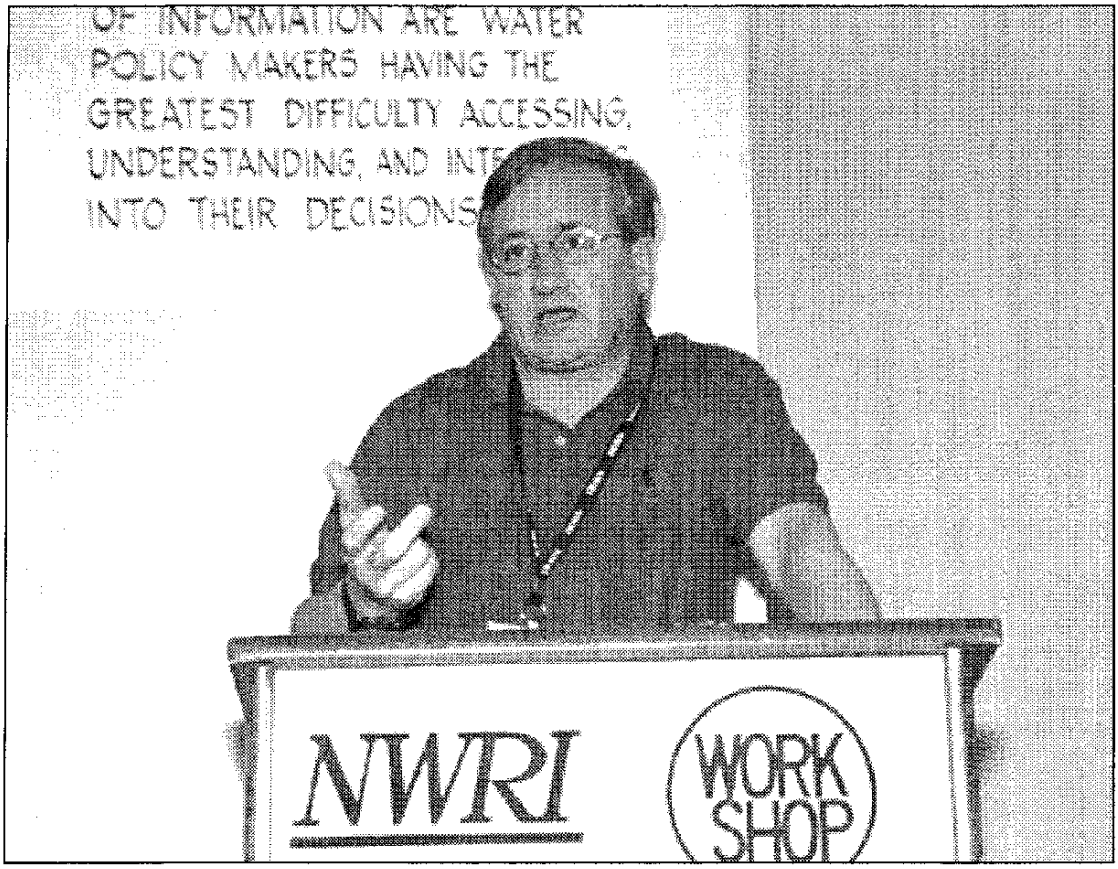
"Interesting that you should refer to up stream and down stream implications. Good to see that a global prospective can be applied to today and tomorrow's technology." – ***Cynthia G. Jones***

"One important driver to specific technologies is the federal approach to drinking water standards. In general, contaminants are dealt with one-by-one, rather than grouped by a treatment approach or, more radically, by applying treatment broadly without specific contaminant standards. Were this to change, the ability to predict and invest in technologies that will last over decades would be enhanced." – ***Bruce Macler***

What happens when a technology is accepted, then the manufacturer goes out of business?" –***Richard Sakaji***

"Demonstrate the universal applicability of the topics importance by drawing examples (and results) from other areas/industries, e.g., nuclear, heath care." –***Thanos Trezos***

"A state office to 'certify' new technology. Proper sizing of water utilities. Can small utilities really develop new technology?" –***John A. Withers***


OF INFORMATION ARE WATER
POLICY MAKERS HAVING THE
GREATEST DIFFICULTY ACCESSING,
UNDERSTANDING, AND INTE
INTO THEIR DECISIONS
NWRI
WORK
SHOP

PRIORITY 8

Orient Key Water Policy Makers with Legislative, Regulatory, Financial Knowledge, and Tools

WORKING GROUP MEMBER:

Withers

Description of This Category of Information:

Water policy makers operate in a complex statutory and regulatory framework. They must understand the basic economic and accounting concepts of key provisions of law if they are to be effective leaders.

Water policy makers continually make decisions involving financial principles. They must understand basic economic and accounting concepts and the range of options available if they are to be leaders. Additionally, they must understand the relationships between federal, state, and local funding approaches to leverage resources for key projects. Finally, they need to know when to think "outside the box" and pursue alternative funding mechanisms. Finally, critical financial information needs to be presented to policy makers in a simple, standardized format that is easy to understand.

Importance:

If water policy makers do not understand basic legislative, regulatory, and economic underpinnings, they will be prone to take unsupportable actions. They will launch ill-advised projects and spend resources on legal and consultant support frivolously. District-sponsored projects will be subject to attack.

The misapplication of sound financial analysis and decision-making will cost water utilities millions! By not leveraging resources with federal and state sources, policy makers will miss creative "out of the box" funding solutions for major desired projects.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Orientation of new board members/senior staff needs to be enhanced. Materials on applicable legislative and regulatory materials should be prepared. A training program similar to what state legislators attend should be considered. Utility policy makers should take mandatory continuing education training much like attorneys and doctors. Test directors annually on current issues/topics. How can we "raise the bar" for all directors and staff?

Water policy makers should continue to work with financial associations, such as the municipal finance officers, California Municipal Securities Association as well as the State Treasurer and Controller to better understand finance concepts and approaches to raise financial and economic I.Q.s. We need to case study successful public/private programs using cooperative, leveraged funding approaches. Finally, website links to related sites, such as the International City/County Management Association (ICMA), would prove useful.

Regional water institutes could play a role as well as U.C. Berkeley, U.C. Davis, Cal State San Bernardino, etc.

Recommended Task Group Memberships:

Generic Task Force Membership – (legislative, regulatory, financial)

- ACWA – Director of Legislative Affairs
- CASA – Director of Regulatory Affairs
- Legal – Chair of ACWA Legal Affairs Committee
- CSDA –Chair of CSDA, Director, Institute
- Lobbyist – Major water resource lobbyist
- Legislative – Water Committee Chair or staff
- Banker – Bank of America Municipal Finance Unit
- Investment Banker – Merrill Lynch Public Finance Group
- Treasurer/Controller Office – Special District Debt Advisory Commission
- Public Affairs Consultant – Media relations expert to package materials
- Large Urban/Small Rural District Representatives
- NWRI

Comments:

"Many directors are risk adverse and choose to not make important decisions. Not to decide is to decide. Risk-taking is a necessary activity for local, state, and federal policy makers." – ***Dennis Albiani***

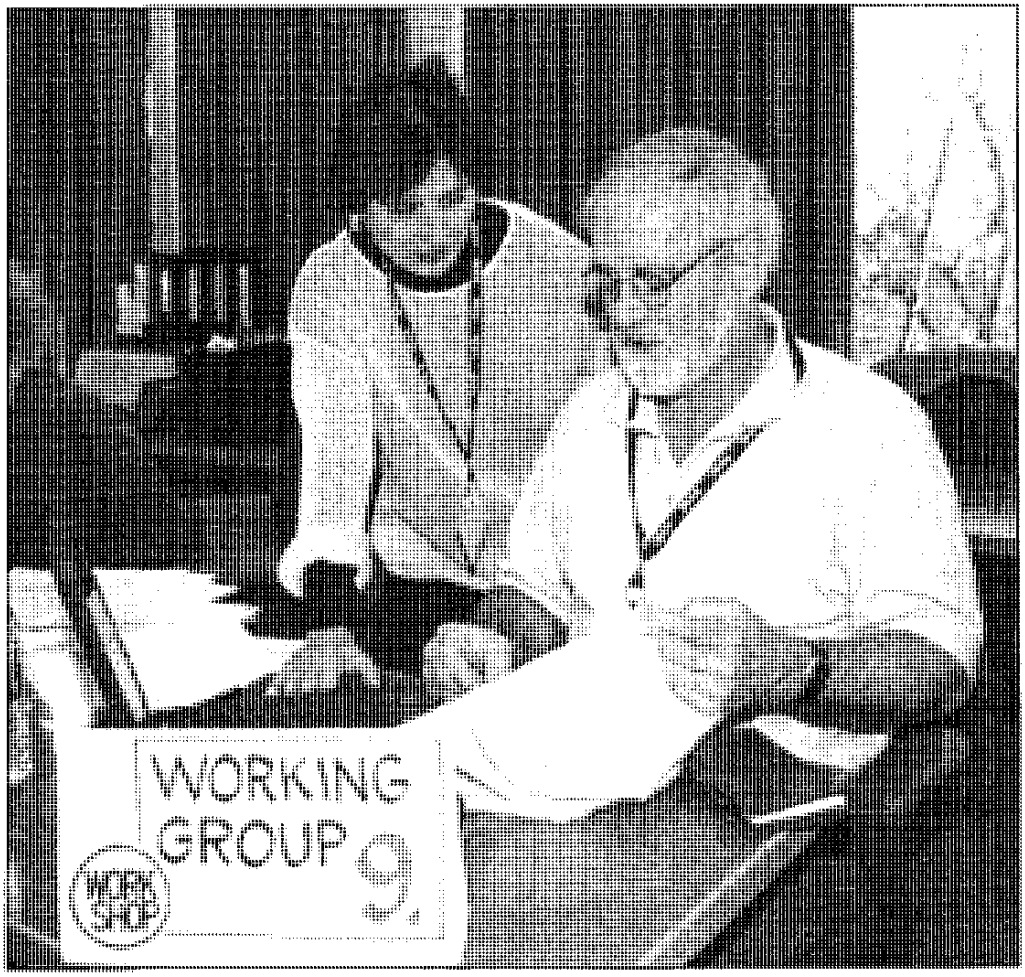
"The California League of Cities provides three 'little books': Council member; Planning Commission; and Finance, City. Each book is 6"x3" in size and can fit shirt and inside coat pockets and in a purse. A book on the water world would be an excellent addition to the set." – ***Art Brown***

"Good report. Important project. There is a definite need for this." – ***Harvey F. Collins***

"Financial education should include the use of reserves, planning, and budgeting for unknowns, prudent set aside for capital investments, etc. Component of rate structures." – ***Williams Goodwin***

"For our elected officials and water policy makers, I feel it is important to come up with modern descriptive terms for describing various degrees of water (e.g., potable, recycled, Title 22, R.O., M.F., etc.) Some of the words we have now are either too technical, too broad, or to vague." – ***Cynthia G. Jones***

"Suggest adding the category of information entitled 'Un-funded Mandates by Policy Makers to Stop!' (found in Priority 13 of the NGT section of this report) into this priority with respect to training of policy makers to ensure they understand the financial options and consequences. Otherwise, it is easy to have frustration and litigation as well as 'unsupportable' projects and mandates with unintended consequences and no common vision. The category of information found in Priority 14 of the NGT section of this report could also be included in this priority as it was used as an example." – ***Eugene A. Schiller***


WORKING
GROUP 9

PRIORITY 9

Integrate Plans for Land Uses and Water Resources Through Watershed Management Techniques

WORKING GROUP MEMBERS:

Dickinson and Rowe

Description of This Category of Information:

Land-use decision-making has traditionally excluded important water resources and water supply considerations. These issues are matters of the public interest and should integrate with statewide objectives for adequate public water supply and local water resources enhancement. Watershed management offers the structure for solving these problems, provided that the problems of adequate information, funding, and authority are solved.

Long-term water resources and watershed development goals should be integrated into local land-use planning and local short-term development projects. Decision makers at state and local levels need additional information and tools to allow integration, such as:

- Form Joint Powers Authorities (JPA) agreements for cooperative management of water resources in watersheds.
- Incorporate local land-use changes into urban water supply projections, and aggregate these projections for a better snapshot of future water supply needs.
- Include 50- and 100-year projections in state and local water supply planning.
- Provide adequate funds at the state level for necessary baseline data gathering.
- Plan to re-evaluate existing local land uses to better adapt to long-term sustainable water resource goals.
- Quantify the values of developed water resources facilities with respect to infrastructure, recreation, and ecology to permit prioritizing projects for future water resource development.
- Incorporate into local land-use planning projects for conjunctive use facilities to ensure that optimal land areas remain available for future water resource development.

- Consider the impacts of inter-basin transfers to the watershed.

- Consider long-term impacts from global climate change in local land-use decision-making.

Importance:

Integrating land-use planning at the local level with statewide objectives for water supply and water resources management is a necessary water supply predictive tool, as well as an important public interest stewardship responsibility. As growth continues, the impact of that growth on available water supplies both diminishes our ability to plan for adequate supplies and eliminates opportunities at the local level to create local supply projects.

Local planning processes need to incorporate water supply considerations into their long-term general planning. If this is not done on a statewide basis, we may well be headed for serious conflicts within 30 to 40 years where even the alternative supplies currently being planned will not be adequate to meet the eventual supply shortfall. The planning, permitting, and construction for major remedies, such as desalination, will require large energy and infrastructure capital investments and will take 20 years to complete. Thus, an assessment of the impact of growth on water supply needs to be made quickly to allow the necessary solutions to be implemented in time.

Just as important as developing large-scale statewide supply options is valuing water resources and land-use planning as interdependent systems at the local level. Communities are beginning to understand the benefits of improving natural, and developing new, ecological systems for multiple benefits, including open lands, wetland and other ecological areas, recreation, water treatment, groundwater percolation and recharge, and flood protection. But at what price? And who pays? And, how do we quantify the value of recycled water and conserved water added into the mix? These alternative sources provide additional multiple benefits to the local environment and should be recognized.

Watershed management should include more frequent use of JPA agreements with elected officials to agree on policies and financing for projects of mutual benefit rather than the alternative of adversarial litigation/disputes. Much more can be accomplished through cooperation than through conflict.

Adjudications of water rights within a watershed are presently limiting water-resources management to "natural" water supplies. They are estimated on limited data and historical land uses without considering changes in climate, agricultural, and urban economies. These are poorly related to increasing use, and ownership, of outside-of-watershed/imported water supplies and to recycled and purified water supplies.

Global climate changes are also expected to pose significant challenges in water resources management. Warmer winters and less snow pack suggest an increasingly shorter winter-spring runoff period and far less runoff available for use during the summer when peak agricultural and urban water supply needs occur. More precipitation within a shorter time frame may overwhelm present flood protection facilities. Water retention and groundwater percolation facilities should be planned to optimally use the groundwater reservoirs as increasingly more important water treatment, storage, and distribution facilities are brought on line.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Water organizations and leaders have the responsibility to alert legislators and local planning officials of the critical need for long-term planning in developing water supplies and water resources options for the future. The State's role will be key in assuring that these local water resources elements are coordinated. Legislation, guidelines, plans, and funding are needed because:

- Water needs should be addressed in State planning requirements. At present there is insufficient guidance in the State Planning Code to allow local land-use planners to incorporate water resources and wastewater projects into the general planning process.

- State legislation and planning are needed to ensure that adequate water supplies, especially recycled water and water purification, are supported and encouraged to compensate for eventual full build-out in all communities. Assistance should be provided to those communities with public acceptance concerns about purified water use.

- An organizational structure for watershed management should be considered. California's Santa Ana Watershed Project Authority (SAWPA) and Florida's system of water-resource-management districts are models of basin-based management that would serve California's needs well.

- Guidelines need to be developed which will focus decision-making on land use policies based on hydrology, the established and future infrastructure development, and hydrogeological conditions. This is important to help guide water supply planning at the local level where groundwater remains available for treatment, storage and distribution of water supplies.

Recommended Task Group Membership:

- Larry Morandi
  National Conference of State Legislatures

- Randy Kanouse
  East Bay Municipal Utility District

- Conner Everts
  Southern California Watershed Alliance

- Martha Davis
  Inland Empire Utilities Agency/Co-Chair CALFED Watershed Workgroup

- Kelly Rowe
  Consulting Hydrogeologist

- Peter Gleick
  Pacific Institute for Studies in Development, Environment and Security

- Lynn Barris
  Valley Protection Association

- Sheila Kuehl
  California State Senator

- Steve Macaulay
  Chief Deputy Director, California Department of Water Resources

- Senator Phil Lewis
  Author of Florida's Water Management District legislation (1960's)

- Sandi George
  American Planning Association, California Section

- Cliff Moriyama
  Legislative Director, CA Building and Industry Association

- League of Cities

- California Association of County Planning Commissioners

- County Supervisors Association of California

Practical Mechanisms So the Information Can Be More Easily Accessed and Used by Policy Makers:

- Federal and State clearinghouses.

- Conferences and websites on availability of watershed management tools, professionals/consultants.

- Efforts on global climate change modeling and practical results – a focus for each state and watershed.

- Conjunctive use plans identifying criteria for prioritizing areas for water resources facilities, especially water supply wells and groundwater percolation/recharge facilities.

Comments:

"Land-use planning must remain at the local level while recognizing the need to effectively incorporate water planning issues. Traditional values, such as private property rights and the area of origin protections, need to be recognized in this process. Additional groups and members to be included:

- California Building Industry Association
- California Farm Bureau Federation
- Agricultural Council of California
- California Association of Counties
- League of California Cities
- Assemblyman Dean Florey
- Senator Jim Costa
- Senator Torlakson
- California Association of Realtors
- Western Growers Association
- Planners and land surveyors
- Mary Shallenberger
- Brent Walthall" – ***Dennis Albiani***

"I agree with the group's recommendations about what water policy makers should be doing, but would enhance the report by re-focusing it on the workshop question of what types of information water policy makers are having difficulty understanding and employing? – ***William Blomquist***

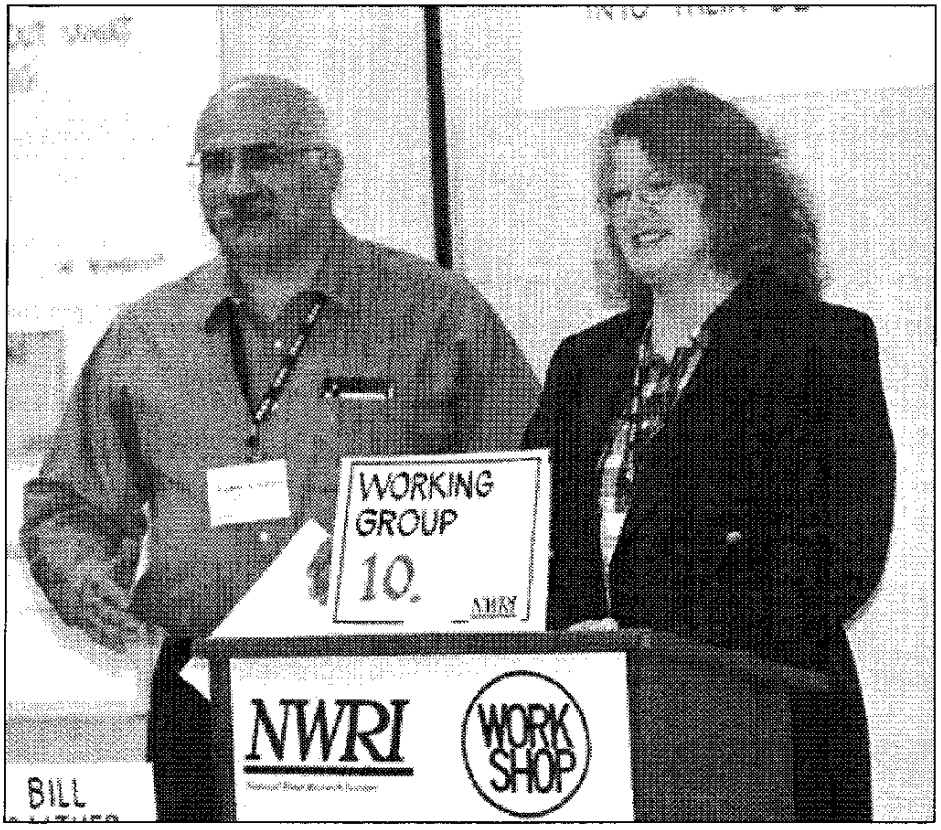
"There must be someone to represent local government, such as the State Office of the California League of Cities. Land use is sacred ground in local government." – ***Art Brown***

"Concur with idea of integrating water resources planning into land-use plans. No specific recommendation." – ***Harvey F. Collins***

"Credibility and clout to have influence on land-use decisions will take an honest, unexaggerated approach to impacts on the watershed." – ***Williams Goodwin***

"The watershed concept is a good reference to global management. I see a close connection with your list of references with Priority 10. Thank you." – ***Cynthia Jones***

"Much work at the Southwest Florida Water Management District is being developed to link drinking water and land use on a planning basis, including a new GIS-based system called CWM (Comprehensive Watershed Management). The CWM will make the Master Water Plan into a living, interactive, planning tool for all stakeholders. What is especially interesting is the accessibility of the CWM to 16 counties and more than 80 cities in the district. This will help with planning for sustainable supplies. More information can be found at the website www.swfwmd.state.fl.us. Contact person: Richard Owen, Director of Planning, SWFWMD." – ***Eugene Schiller***



PRIORITY 10

Identify and Communicate Global Concerns for Water

WORKING GROUP MEMBERS:

Jones and Schiller

Description of This Category of Information:

Global refers to any stakeholder impacted by water use in a planning area or district (city, county, region, state, interstate, or country). Without current shared knowledge, uninformed decisions are being made at all levels leading to negative and costly consequences.

The lack of a global perspective perpetuates misinformation. Both public and private officials lose credibility when solutions are enacted that are not fair to all who are impacted. Policy makers may not have the technological background or information to understand the issues, but without a global perspective, they adopt ineffective policies without understanding the ramifications of their actions.

Rapid population growth will create a need for new infrastructures that will compete for finite resources. Without a global understanding between all the stakeholders, unintended negative consequences will continue on a regular basis; i.e. a lack of good quality water for all the stakeholders, including the environment.

Importance:

- Projects become more costly to develop due to mitigated demands placed by downstream users. Partnerships with upstream projects could lead to savings in the long run for downstream users.

- Without on-going public education programs, misinformation leads to distrust, frustration, anger, inaction, and costly litigation.

- Customers need to be educated, beginning in grade school, that it is in our collective best interest to play a role in our neighbors' success. No longer can we, or should we, ignore our regional dependence on our neighbors and the impact on downstream users.

- Decision makers who do not understand technical data will make sub-optimal solutions that result in the waste of resources or have negative environmental impacts.

- Without an expanded regional perspective, our collective ability to meet growing water resource demands will limit shared sustainable economic growth.

- We all must work together for our own self-interests.

- A key, all-inclusive, comment: The bottom line is communication, communication, community involvement, and communication. We are all in one tent together – win/win situations need to be created every day. There is no other choice.

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Engage in structured dialogues that include, but are not limited to, economists, scientists, engineers, planners, public interest groups, and public officials.

- Bring to public attention on a regular basis the impact of population growth on water policy and sustainability.

- Need interactive websites, links, and prototypes that include, but are not limited to:

  - International City/County Management Association LGEAN Website.
  - Southwest Florida Water Management District K-12 curriculum and website conservation campaign and database
  - Water Reuse Association
  - National Water Research Institute
  - American Water Works Association

Recommended Task Group Members:

- Tracy Clinton P.E.
  Carollo Engineers
  Walnut Creek, California

- Shannon Flanagan
  International City/County Management Association
  Washington, D.C.

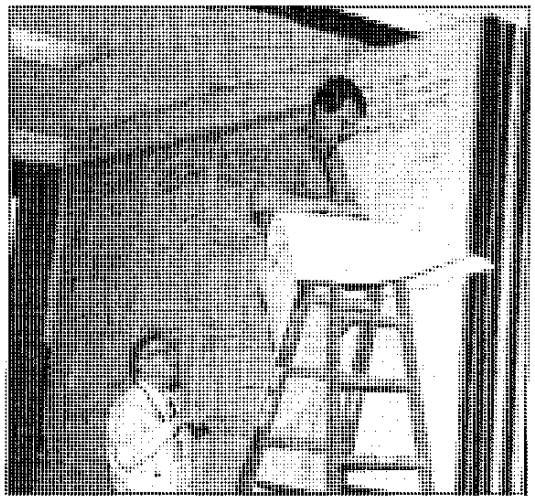
- Laura Johnson
  Supervisor of Water Reclamation
  EBMUD
  Oakland, California

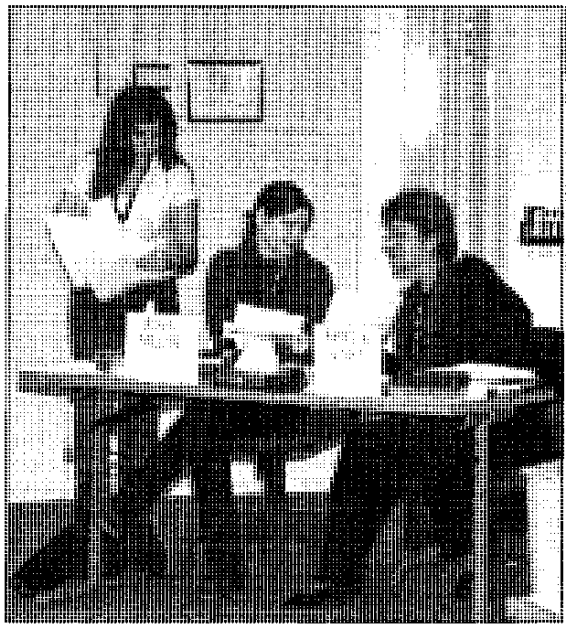
- Linda McBride
  Director of Communications and Government Affairs
  Southwest Florida Water Management District
  Brooksville, Florida

Comments:

"An expanded definition of the value of water is needed for a productive discussion on the sharing of costs and benefits of development." – ***Williams Goodwin***

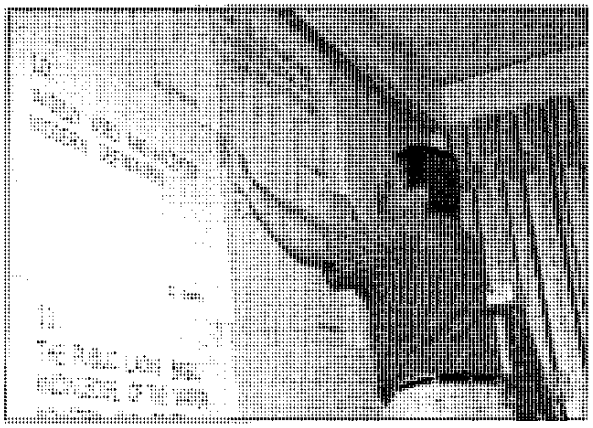
"Agree with the need to look at the big picture (global)." – ***Harvey F. Collins***

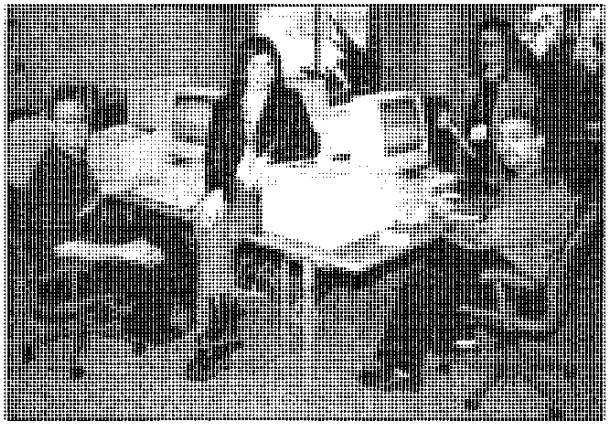


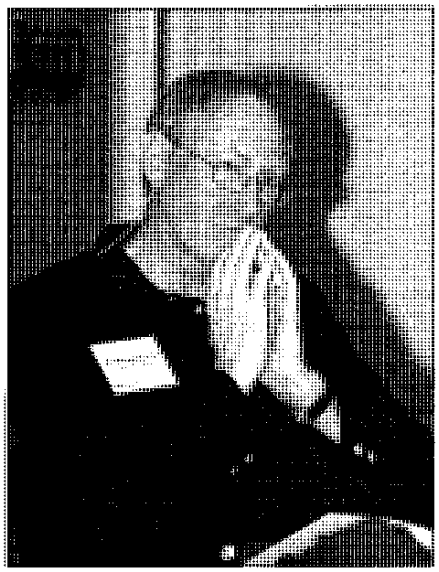


PART 2

NGT WORKSHOP







INTRODUCTION

In the late 1960s, several University of Wisconsin Professors, led by Andre Delbecq, examined the dynamics of small meetings. Their goal was to design a practical method for a group of individuals to meet and quickly come to consensus on an issue that could not be resolved adequately by one individual. One result of their work was the Nominal Group Technique that ensures that (1) the group will begin productive work immediately upon convening, and (2) that each individual's contributions will be heard, respected, and considered equitably by all members of the group.

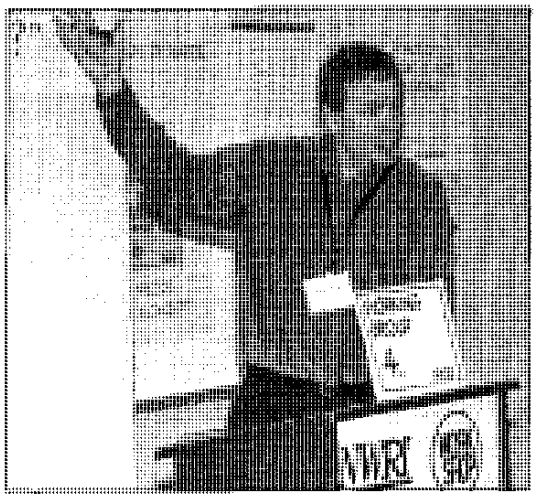
The staff of NWRI, and the various experts they consulted, identified leaders in the field of knowledge management. A list of workshop participants is given in Appendix C.

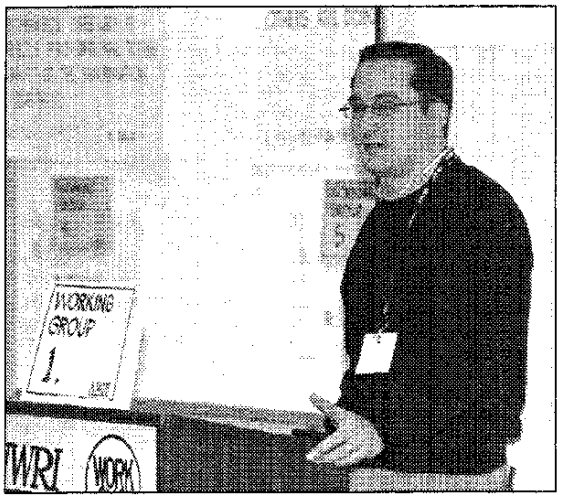
Before coming to the workshop, participants were asked to consider the question: ***What specific categories of information are water policy makers having the greatest difficulty accessing, understanding, and integrating into their decisions?*** Participants arrived at the Kellogg West Conference Center on Friday evening. Following dinner, participants took their assigned seats in the workroom. Workshop Guidelines and Procedures were reviewed, working forms discussed, and a detailed schedule of the coming day-and-a-half of work reviewed. Participants then to prepared for Saturday's NGT session.

On Saturday morning, the NGT workshop began. It comprised three separate steps:

- Identification of categories of information.
- Consolidation of categories into major category areas to minimize overlap between category areas.
- Ranking of major category areas in descending order of importance by each participant.

The 18 participants identified 77 categories of information during the morning. The workshop secretary and the facilitator contributed four of the 77 categories. The title of each category proposed was hand-lettered on a large sheet of paper, numbered sequentially, the author's name noted, and posted on the workroom wall. After lunch, the participants were guided through a process of grouping each proposed category of information into major category areas. At the conclusion of this step, 20 major category areas remained. Finally, each participant, acting alone, ranked his or her perception of the ten most important category areas in descending order of importance. Each participant signed his or her ranking form. Throughout the day, participants edited and improved text of category write-ups they proposed.

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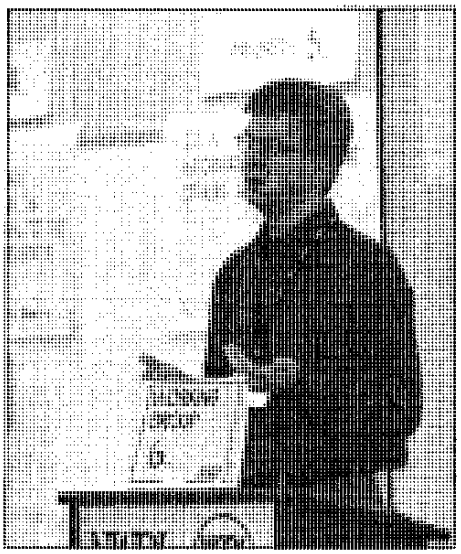
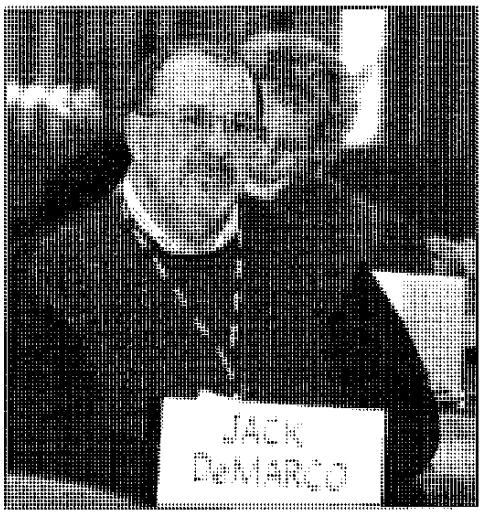



JACK
DeMARCO

PRIORITY 1

Understand Constituents' Needs and Wants and Learn to Operate Within Them While Effectively Altering Them When Necessary

ORIGINATORS:

Albiani on behalf of himself, Blomquist, Conklin, DeMarco, Linsky, and McDaniel

The following categories of information were consolidated under the above title:

Title: **Understand Constituents' Needs and Wants and Learn to Operate Within Them While Effectively Altering Them When Necessary**

Originator: **Albiani**

Category of Information Description:

Policy makers often fail to understand constituents' beliefs, values, and needs. This failure results in bad decisions being made that are later rejected or ridiculed by constituents.

At other times, when constituents fail to recognize existing challenges with water, policy makers often are unaware of this lack of understanding and proceed with a decision that may be a good decision but is criticized and ultimately fails because not enough time and resources were allocated to assisting one's constituents to understand the needs.

Importance:

Poor decisions are being made; good decisions are not being supported by the public.

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Conduct very sophisticated polls and surveys.
- Invite policy makers, decision makers, and the public to sessions designed to gain support for concepts and decisions.
- Develop strategies, when necessary, to alter the public's attitude.

Title: **Information About Public Opinion**

Originator: **Blomquist**

Category of Information Description:

Obligated to serve their constituents or clients, policy makers nevertheless face choices without (or with insufficient) information about their constituents' or clients' concerns, priorities, and preferences. This is not because there are not enough public opinion polls conducted in the United States, but because the ones that are conducted exclude water-relevant either issues altogether or include them only tangentially. Furthermore, conducting separate and water-specific public opinion surveys (or other techniques, such as focus groups or assemblies) is expensive and, often, beyond the means of water policy makers, especially at the local level. For all of these reasons, water-policy makers have difficulty accessing, understanding, and integrating information about public opinion into their decisions.

Importance:

If policy makers have to guess at public opinion, they run risks of making at least two important mistakes. First and most obvious is misjudging public concerns, and either missing opportunities to develop and protect water resources in ways that would have public support, or wasting valuable resources on decisions and actions that end up colliding with unforeseen opposition. Second is not recognizing whether, when, and how to exercise some leadership in public opinion formation.

How Can This Category of Information Be Better Conveyed to Policy Makers?

In the United States, organizations such as the Water Education Foundation, American Water Works Association Research Foundation, U.S. Environmental Protection Agency, U.S. Bureau of Reclamation, U.S. Army Corps of Engineers Water Resources Institute, and the Water Resources Research Centers in all 50 states could spread the costs and improve the regularity of information about public opinion by financially supporting a systematic program of developing and disseminating that information for communities throughout the nation

Title: **Similarities and Differences in Cultural Values Related to Water, Science, and Government**

Originator: **Blomquist**

Category of Information Description:

Sub-populations within any jurisdiction have perceptions about the importance and value of water resources, the integrity and use of scientific research, and the efficacy and credibility of government officials and actions. These perceptions overlap to a great degree, but there can also be important differences among sub-populations in those perceptions.

Importance:

If not understood, cultural differences can undermine the effectiveness of public education campaigns, exacerbate mistrust of water-policy makers and, in some cases, even create unanticipated crises for proposed projects. Any of these undesirable outcomes represent lasting negative impacts on water policy and, therefore, ultimately on public health and safety.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Yet another addition to the curriculum for new water policy makers.

Title: **The Social, Cultural, and Ethical Implications of a Decision**

Originator: **Conklin**

Category of Information Description:

A policy decision may initially be based on information drawn largely from the scientific and technical community without considering a broader context of social, cultural, and ethical considerations. Science may dictate action "X." Community values, however, may dictate action "Y."

How can policy makers be sure that they are filtering the appropriate scientific and technical information through the appropriate community "indicators," to ensure that policy is based on both *logos* and *ethos*?

Importance:

Clearly, there could be differences between actions dictated purely by objective scientific criteria and those dictated by more subjective, value-based criteria. Moreover, the subtleties of a specific issue might make that issue innocuous to the majority of a community, but highly contentious to a significant minority. The problem, then, is to ensure that the context of information on which a decision is based includes all of the types of knowledge required to validate that decision.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Consider identifying all knowledge domains that must be used to create a full contest of information behind a decision. Create a standard "structure" for this knowledge, and then design a process that will ensure that all knowledge domains are considered before a decision is made.

Consider designing a uniform process to review and validate data. Make it uniform so it can be managed and improved over time. Consider creating an advisory group of some type, made up of generalists from the community, whose role is to assist in ensuring that all requisite knowledge domains have been considered.

Managing and improving a "mess" as opposed to managing and improving a system.

Title: **What the Public Wants and What They Are Willing to Pay for!**

Originator: **DeMarco**

Category of Information Description:

Surveys conducted every 2 years locally show that high water quality remains consistently at the top of the list of consumer needs. Their definition of quality tends to mirror federal regulations, although they do distrust the feds as not being objective. When asked how much consumers are willing to pay, over 80 percent surveyed were willing to spend less than two dollars per month more on their water bills. The bottom line showed that avoiding adverse health must be a part of spending more money.

Importance:

Without federal regulations, including a clear-cut assessment of the benefits achieved, the implementation of needed technology faces increasing resistance. Primarily, gearing explanations to the public's level of understanding is sorely needed as an adjunct to consumer confidence reports now required on existing regulations.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Not sure, but risk/benefit – risk/assessment technologists must play a role.

Title: **Consumer (Decision Makers) Acceptance Strategies**

Originator: **Linsky**

Category of Information Description:

All too often, the water community neglects to assess what the consumers of information/data need, in what form, and at what level of sophistication.

Importance:

The story must be "received," if it is to be valued and accepted.

How Can This Category of Information Be Better Conveyed to Policy Makers?

The transaction of highly technical, scientific, or economic language must be a part of any project proposal (scope of work).

Title: **Create a Spokesperson for the Water Industry**

Originator: **Linsky**

Category of Information Description:

All too often, the media (i.e., television and movies) deliver plausible, believable information, and mostly disinformation, to the decision maker and constituencies.

Importance:

The United States is a nation of "hero" worshippers. The water industry needs to take advantage of this and find a "spokesperson" to validate the information and data.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Need to find a "Carl Sagan-type" of person who will project information/data through various media.

Title: **Keeping Erin Brockovich Out of the Water Business by Educating the Family Doctor**

Originator: **McDaniel**

Category Description:

Many people do not want to explore the complexities of water safety – they want to know, "Is it safe or not?" The person that most surveys show to be the most trusted source of health information is the family doctor.

Importance:

Since people tend to believe information that comes from a "trusted" source, informing that source (the family doctor) makes good sense for policy makers.

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Short, easy-to-read articles in medical publications.
- Grand Rounds.
- Committees like the Santa Ana River Water Quality and Health Effects Study.
- Active outreach to physicians and university professors.

PRIORITY 2

Public Desire to Determine and Assure the Safety of Their Drinking Water

ORIGINATORS:

Macler on behalf of himself, DeMarco, Goodwin, Jones, Kinshella, McDaniel, and Sakaji

The following categories of information were consolidated under the above title:

Title: **Public Desires for Safety of Their Drinking Water**

Originator: **Macler**

Category of Information Description:

In any situation, a variety of public views exist with respect to the expected and necessary safety of their drinking water. These views are infrequently assessed adequately and often misunderstood or ignored. The various views of policy makers affect this process and can derail public participation.

Importance:

Lack of attention to the full variety of public views can lead to dissatisfaction and distrust of drinking water and its providers. It can also lead to wasted resources. It can lead to unsafe water.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Opening of process to all interested parties – find out who these "customers" are and recruit them.

Title: **Demonstrating the Safety of Drinking Water**

Originator: **Macler**

Category of Information Description:

After the "safety" of drinking water has been determined and appropriate technologies, processes, and regulations have been applied, what remains is to demonstrate to the public that safety has been achieved.

Importance:

Without appropriate feedback on the success of a protective activity, decisions may be redundant, wrong, or wasteful.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Data and its interpretation need to be developed prior to subsequent decision-making. It would be best to build protective activities in a way that provide this information.

Title: **What the Public Wants and What They Are Willing to Pay for!**

Originator: **DeMarco**

Category of Information Description:

Surveys conducted every 2 years locally show that high water quality remains consistently at the top of the list of consumer needs. Their definition of quality tends to mirror federal regulations, although they do distrust the feds as not being objective. When asked how much consumers are willing to pay, over 80 percent surveyed were willing to spend less than two dollars per month more on their water bills. The bottom line showed that avoiding adverse health must be a part of spending more money.

Importance:

Without federal regulations, including a clear-cut assessment of the benefits achieved, the implementation of needed technology faces increasing resistance. Primarily, gearing explanations to the public's level of understanding is sorely needed as an adjunct to consumer confidence reports now required on existing regulations.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Not sure, but risk/benefit – risk/assessment technologists must play a role.

Title: **Level of Contaminant Removal Necessary to Realize Measurable Health Benefits**

Originator: **Goodwin**

Category of Information Description:

Metals and other contaminants that may occur naturally or because of human activities are known as toxins or carcinogens. Total removal is costly or impossible. Policy makers need to know if the benefit of removal is linear or stepped. Based on scientific data with consideration of other sources of exposure, thresholds of the benefits can be determined, and priorities set, for investments in research and technology. Acceptable thresholds may vary by locality.

Importance:

As the demand for water increases, communities will tap into additional aquifers and expand reuse. The public deserves safe drinking water with full disclosure. Thresholds are necessary to determine the viability of alternative water supplies and to protect existing supplies.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Research at universities must include input from water purveyors and resource experts, such as NWRI. Other sources of exposure, which may yield much higher reductions for every dollar invested, must be explored and considered as an alternative reduction of risk.

Title **How Pure is Pure?**

Originator: **Jones**

Category of Information Description:

We keep identifying what is in our water. We keep purifying our water to a finer degree versus other countries (e.g., United States versus Mexico).

Importance:

If our water is too pure, we will lose the benefits of our immune system. We will no longer need to fight that which no longer exists. We will someday become isolationists – unable to travel throughout our own world. How far do we go to address public concerns? Are the concerns all valid? Hidden agendas brought forth to sabotage a project are becoming more and more popular. How can we address and handle these ideas? – confidence and truth.

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Education and knowledge will create confidence.
- Willingness to spend time learning.
- Confidence can sell itself.
- NWRI – Water Reuse Association.
- Ask questions.
- Get involved – make water the priority it deserves in your life.

Title: **Present Method of Regulatory Enforcement Creates Distrust**

Originator: **Kinshella**

Category of Information Description:

A "gotcha" attitude in regulatory enforcement does not create trust in the quality of the water supply. Many violations are for paperwork, not for real water quality problems. At the conclusion of an enforcement action, the regulator issues a huge press release showing how they have caught the bad guys. This does not increase the public's trust in either the regulator or the water agency.

Importance:

The public does not trust the water agency to make good decisions and does not trust the regulators to permit only safe projects.

How Can This Category of Information Be Better Conveyed to Policy Makers?

We need to develop a working relationship between the operating agencies and the regulatory agencies. Our water supplies must be of the highest quality. Water agencies and regulators must be partners in achieving this goal and in letting the public know we are achieving this goal. In working together, we can gain the public trust in our decision-making.

Title: **Why Should White Male Engineers Rule the World? Whose Risk Is it Anyway?**

Originator: **McDaniel**

Category of Information Description:

Decide, announce, and defend are the current ways most agencies make decisions. It is not working! The lack of inclusion of non-traditional voices early on in the process can doom worthy projects. The symbolic and emotional values of water are largely ignored in favor of technical or scientific jargonizing.

Importance:

Projects are often way down the road before any thought is given to including a broader audience. Trust is lost on both sides. Important projects do not get done because of the lack of buy-in.

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Conduct workshop/symposia aimed at policy makers to highlight differences in risk values and judgments in different constituencies.
- Disseminate case studies of successful examples of early inclusion (e.g., Eugene Schiller's example of the inclusion at the conceptional level for Tampa Bay desalination plant).

Title: **How Safe is Safe Enough? – Demystifying Health Risk Assessment**

Originator: **McDaniel**

Category of Information Description:

The public sees health risk assessment as a black box—bunches of assumptions go in and, at the end, the answer comes out – SAFE!

Importance:

The mystery of the "black box" leads the public and policy makers to either blindly trust or distrust the result largely based on the credibility of whoever delivers the result. Those who "believe" in risk assessment are unwilling to talk about the assumptions that went in and are even more unwilling to talk about the uncertainty about the final results.

How Can This Category of Information Be Better Conveyed to Policy Makers?

There needs to be better inclusion of the "non-technical public" in the design stage of a risk assessment – buy-in on assumptions, methodology, even hiring "experts" for under-represented groups, like the Technical Assistance Grants given to communities around superfund sites.

Title: **Why are Risk Managers Not Embracing Microbial Risk Assessment Methodologies and What Can Be Done to Improve Risk Assessment Usefulness?**

Originator: **Sakaji**

Category of Information Description:

At present, microbial risk assessments are used as a tool for setting water quality policy in specific, but limited, situations. While this field needs to mature, some water quality policy is being set using these tools. However, microbial risk assessments are only used in a cursory manner in setting primary standards. The field has not matured to the point of being used in cost/benefit analyses in a manner analogous to the way toxicological information has been used in cost/benefit analyses for primary drinking water standards.

Microbiological water-quality standards are still set using bacterial indicators even through microbial hazards include viral and protozoan pathogens. Beach closures, distribution-system microbiological water quality, source water quality, just to name a few, rely heavily on bacterial indicators (coliforms or *E. coli*) to determine when the microbiological quality of the water is not safe.

Given the poor correlations between the emerging pathogens (viruses and protozoans, especially) and the bacterial indicators, one must wonder if we are not courting disaster? New indicators are entering the arena (e.g., *Clostridium perfringens*, bacteriophage, genetic fingerprinting, etc.), but the fields are still awash in controversy with respect to the protocols and the interpretation of data that risk managers are still confident they can be used to establish standards.

The development of improved analytical methods is not enough. The data must be interpreted and fed into a risk assessment to allow the formulation of clear unambiguous standards.

Different microbial risk assessment protocols result in different endpoints. Which endpoint does the risk manager select as being correct? Based on the errors accumulated through the assumptions and data used in the risk assessments, are the different outcomes necessarily different? Aside from rendering an opinion, there should be a means of evaluating this question (error analysis).

How can we increase our confidence in the microbial risk assessment process?

- Develop better analytical tools to more precisely and accurately characterize the threat.
- Improve monitoring schemes to better characterize the temporal nature of the problem (cyclic, seasonal, and weather).
- Examine human population response to the threat.

- Analyze the deficiencies of current microbial risk assessment protocols to determine common ground and to evaluate weaknesses.

- Survey policy makers to determine the source of their reluctance to use microbial risk assessments in the setting of primary standards.

Importance:

High.

How Can This Category of Information Be Better Conveyed to Policy Makers?

The fragmentary proliferation of analytical methods and environmental fate and occurrence data needs to be neatly packaged with the goal to establish new or additional microbiological water-quality indicators. Without an effort to organize and present this data in a structured format, the use of the data will always be limited.

Several projects are needed to examine each of the microbial risk assessment issues identified above, but someone also needs to tie the materials together into a protocol or framework that risk managers can use.

EOA, Inc. (Joe Eisenberg, Jeff Soller, Adam Olivieri, Don Eisenberg, Oakland, CA), Water Environment Research Foundation (WERF), American Water Works Association Research Foundation (AWWARF), U.S. Environmental Protection Agency (U.S. EPA), C.N. Hass (Drexel University), and R. Trussell (Montgomery-Watson).

PRIORITY 3

The Importance of Doing Something Correctly With Appropriate Processes the First Time

ORIGINATORS:

Albiani on behalf of himself, Blomquist, Collins, Jones, McDaniel, and Schiller

The following categories of information were consolidated under the above title:

Title: **The Importance of Doing Something Correctly With Appropriate Due Process the First Time**

Originator: **Albiani**

Category of Information Description:

How much due process is correct? Each project has its own requirements because of regional issues, culture, concerns, etc. It is of imminent importance to do it correctly the first time because you often will not get a second chance.

Importance:

Peripheral Canal, Auburn Dam, and "Toilet to Tap": the need is apparent for many of these projects, and significant funds have been spent, but it will be a long time until the negative perceptions of these projects are overcome.

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Show policy makers examples of good ideas that were poorly presented and how that ruined the projects.
- Illustrate that the amount of due process necessary per project will vary through case study evaluations.

Title: **Information About Public Opinion**

Originator: **Blomquist**

Category of Information Description:

Obligated to serve their constituents or clients, policy makers nevertheless face choices without (or with insufficient) information about their constituents' or clients' concerns, priorities, and preferences. This is not because there aren't enough public opinion polls conducted in the United States, but because the ones that are conducted either exclude water-relevant issues altogether or include them only tangentially. Furthermore, conducting separate and water-specific public opinion surveys (or other techniques, such as focus groups or assemblies) is expensive and, often, beyond the means of water policy makers, especially at the local level. For all of these reasons, water-policy makers have difficulty accessing, understanding, and integrating information about public opinion into their decisions.

Importance:

If policy makers have to guess at public opinion, they run risks of making at least two important mistakes. First and most obvious is misjudging public concerns, and either missing opportunities to develop and protect water resources in ways that would have public support, or wasting valuable resources on decisions and actions that end up colliding with unforeseen opposition. Second is not recognizing whether, when, and how to exercise some leadership in public opinion formation.

How Can This Category of Information Be Better Conveyed to Policy Makers?

In the United States, organizations such as the Water Education Foundation, American Water Works Association Research Foundation, U.S. Environmental Protection Agency, U.S. Bureau of Reclamation, U.S. Army Corps of Engineers Water Resources Institute, and the Water Resources Research Centers in all 50 states could spread the costs and improve the regularity of information about public opinion by financially supporting a systematic program of developing and disseminating that information for communities throughout the nation.

Title: **When Projects Fail for Reasons Other Than Lack of Information or Mistakes on the Part of Proponents**

Originator: **Collins**

Category of Information Description:

Political opposition to a project may develop. Technical people, regardless of gender, are not proficient in communicating with the public. The use of nuclear energy for any purpose (e.g., the irradiation of food) and anti-growth opponents using "cancer-scare" terminology will implant fear into the minds of many.

Importance:

Political opposition can only be fought via political processes – not by technical jargon. Unless project proponents recognize the political problem and deal with it appropriately, worthwhile projects will not be approved.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Education, education, education (at all levels).

Title: **Widely Used and Accepted Modern Definitions (i.e., What Is a New Water Source?)**

Originator: **Jones**

Category of Information Description:

How do we define a new water source? We need common terms and an understanding of these terms.

Is contact with nature the only way to become new again? Can't technology replace nature?

As technical terms, we have "potable," "non-potable," "Title 22," and "recycled water." We have "reverse osmosis" (RO) and "microfiltration." We need to further define these terms for the public to understand in lay terms.

Importance:

There is a basic distrust of science. Costs and time are higher when technology cannot be trusted. We need to level the playing field. We need to be able to communicate with all people (the public) with words that are self-explanatory.

People do not understand the fine differences within treatment levels. "Yes," "No," "potable," "non-potable" are easy words.

Now, we need to develop further language to clarify differences of refinement and the degree of purity.

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Education.
- Let the media help.
- Educate public figures.
- Lobby governmental agencies to make search findings.
- NWRI, WateReuse Association, American Water Works Association, Association of California Water Agencies.

Within our own community develop further words – RO = pristine water, potable = first water - source of water, etc.

West plant versus scalping plant.

Title: **Coming Out of the Water Closet – Plain Talk About Water Reuse for "Joe Six Pack"**

Originator: **McDaniel**

Category of Information Description:

Clear information about water reuse is essential to sell the project and avoid charges of "cover-up" later on. Several water-recycling projects are described as "groundwater replenishment" using "highly heated wastewater" or "tertiary effluent." These attempts to "pretty-up" what the public sees as "sewer water" hurt credibility. Agencies can use plain talk without fear of reprisal.

Importance:

If agencies hide behind euphemisms and acronyms, the public feels they are trying to hide the truth, and trust is lost.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Present successful case examples of plain-talk success stories.

Title: **Public Organizations Need to Invest in Experienced Public Relations, Mediation Staff, and/or Consultants**

Originator: **Schiller**

Category of Information Description:

- At mercy of private sector proposers or complainers.
- Not ready to deal with water issues if the public is not sensitized.
- Attacked by media and neighborhood groups with no response inquiries that work.
- Need to combat misinformation all the time; otherwise, wait for the crisis to create opportunities to move forward.
- Reactive environment and siege mentality prevails.

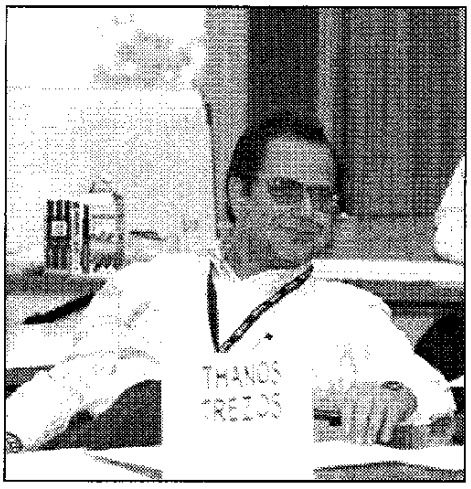
Importance:

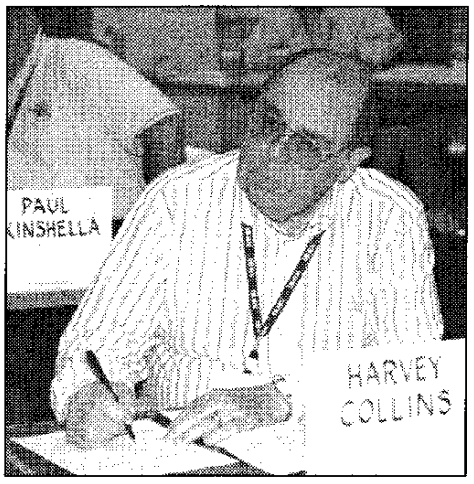
- Need to be able to speak with one voice as an organization and help create consensus in the public good.
- Need campaigns to educate the public.
- Need to do professional surveys and public opinion polls to see if the message is providing support; otherwise, working in the dark.

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Topic for state and national conferences. NWRI should develop manuals and user committees to discuss best management practices, resource costs, and leveraging campaigns.

- Need retreats for public entities within the community (Chambers of Commerce, Public officials, etc.) to create and convey strategic visions.





PRIORITY 4

The Usefulness of Any Information Category Is Directly Proportional to the Quality of the Information It Contains

ORIGINATORS:

Sakaji on behalf of himself, Brown, Collins, Conklin, Jones, Kinshella, Macler, McDaniel, and Trezos

The following categories of information were consolidated under the above title:

Title: **The Usefulness of Any Information Category Is Directly Proportional to the Quality of the Information It Contains**

Originator: **Sakaji**

Category of Information Description:

Any decision-making process will only be as good as the information used to justify the decision. Judging the quality of information used in developing or setting water policy should be uniform. No policy will be any better than the least reliable piece of information on which the policy is based.

Clearly, one needs to view environmental and public health problems/issues as being dynamic or in a constant state of flux. As research is conducted, a clearer picture develops, but the need for policy often comes at a time when critical information is lacking. Hence, policy development requires the implementation of good judgment grounded in technical fact.

The ability to clearly identify uncertainty and unknowns can influence the quality of the policy-making decision, but are only loosely factored into the decision-making process. Apparent incongruities and inconsistencies in between policies may be traced to the influence of unknowns and uncertainties in the technical data on which policy decisions are based and the relative reference point from which the policy is derived. At present, the policy maker decides the quality of the information it is using in setting policy.

At every point in a risk assessment. data must be interpreted before it is used. Knowing the degree of uncertainty associated with a particular interpretation would aid the risk manager in determining the degree of confidence that should be placed in the final result.

Importance:

High.

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Need to develop a protocol for error analysis.
- Establish a protocol for trading-off unknowns and uncertainties given specific goals and constraints.

Title: **Contaminant/Problem De Jour**

Originator: **Brown**

Category of Information Description:

The Southern California Association of Governments (the metropolitan planning organization for 6 counties and 184 cities) has a Water Task Force that makes recommendations to the Energy and Environment Committee that in turn makes recommendations to the governing board, the Regional Council.

The task force comprises elected officials, water providers, and private industry. The elected officials, for the most part, have very little training in the water field and are sometimes influenced by media reports of the latest investigative report. This results in requests for information on the latest problem and forgetting the last meeting's requests.

Importance:

This lack of knowledge of the water field results in a lack of focus by the members and no recommendations going forward from the task force because of the changing priorities of the members.

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Set up a curriculum with the League of Cities so that elected officials can take courses in water education that will count toward their Master Council Member certificate.
- Could be set up by the NWRI.

Title: **Is the Project Safe? If So, Why Are the Experts in Disagreement?**

Originator: **Collins**

Category of Information Description:

Challenges to the safety of a project can come out of the blue. Project opponents frequently hire their own experts to counter the opinions of scientists and engineers in industry and government who support the project. By questioning the safety of a project (e.g., the proposed Auburn Dam is near an earthquake fault; the proposed Ward Valley Low Level Radioactive Waste Site will contaminate the Colorado River; and the San Diego Water Purification Project is unsafe... "Toilet to Tap"), doubts are planted in the minds of consumers, the public, and policy makers. Thus the question, "How can we know the project is safe when the experts disagree?"

Importance:

Erroneous information is as bad or worse than the lack of information. Project opponents can hire individuals, be they engineers, scientists, or attorneys, who will find ways to challenge the safety of any project. Policy makers must "know their source" when evaluating technical information submitted in support of, or opposition to, a project. I know of no way to quantify the lack of information or the amount of erroneous information regarding a project.

How Can This Category of Information Be Better Conveyed to Policy Makers?

One cannot convey information to policy makers if they will not listen. It is imperative that we re-establish trust. Many politicians do not trust government engineers or scientists, but view them as bureaucrats. Because of this lack of trust, they look frequently to environmental groups for their scientific and technical information. These policy makers have been educated over the past 40 years that:

- Industry pollutes.
- Government scientists are bureaucrats who cannot be trusted.
- Environmental groups are the only voice that can be trusted on environmental issues.
- This must be changed, and perhaps the best way to start is in our grade schools.

Title: **When Projects Fail for Reasons Other Than Lack of Information or Mistakes on the Part of Proponents**

Originator: **Collins**

Category of Information Description:

Political opposition to a project may develop. Technical people, regardless of gender, are not proficient in communicating with the public. The use of nuclear energy for any purpose (e.g., the irradiation of food) and anti-growth opponents using "cancer-scare" terminology will implant fear into the minds of many.

Importance:

Political opposition can only be fought via political processes – not by technical jargon. Unless project proponents recognize the political problem and deal with it appropriately, worthwhile projects will not be approved.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Education, education, education (at all levels).

Title: **Who Knows What?**

Originator: **Conklin**

Category of Information Description:

Who are the recognized experts, in the United States and abroad, on specific water-related issues, and how can I reach them and access their knowledge? This is the basic question that plagues knowledge management professionals. This, some would argue, is the reason for the existence of the discipline.

People share information with those with whom they have an actual, trusting relationship. Relationships, not technology, are the "highways" or "pipelines" along which knowledge flows. Research shows this.

Culture and knowledge hoarding are the biggest barriers. Does this community have a history of sharing knowledge? The adage – "Build it (a knowledge-sharing system), and they will *not* come."

Importance:

Without knowing whom the experts are, decision makers will lack confidence. Timelines will be extended. Less qualified experts may gain a disproportionate voice. In some cases, a gap may appear between proven scientific and technical hypotheses and the ways in which these hypotheses are acted on in the community.

How Can This Category of Information Be Better Conveyed to Policy Makers?

- "Yellow pages" of experts conducting research in the field.
- Knowledge map.
- Conferences and gatherings.
- Annotated bibliography.

Title: **Compelling, Understandable, and Usable Summaries of Scientific and Technical Information**

Originator: **Conklin**

Category of Information Description:

What, for public policy purposes, is the essential meaning and the most significant implications of the technology or science described in this research report? How do we move this technology from the laboratory and into the community? What are the costs and benefits? Are there practical implications, or is this for the time being more akin to "pure science?" How will the public feel about this? Should we act, engage in further study and validation, or dismiss this as a dead-end?

How, from the enormous volumes of scientific data and from the impenetrable prose of most "official" and scientific discourse, can I extract the concise meanings that I need in order to make effective, inclusive, and robust policy?

Importance:

This is a pervasive and endemic problem experienced by generalists who use and base decisions on information produced by specialists. The problem has to do with the attitudes and inclinations of the two "camps" – one concerned with relationships and connections between separate bodies of meaning, and the other concerned with depth and technical accuracy within a single body of meaning.

The lack of this information will bring confusion to policy processes and will require the creation of lengthy and costly processes to distill and interpret the meanings of scientific discourse.

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Define reporting requirements, with additional rigor, by those who fund research.
- Create a national web-based vehicle to interpret and disseminate information.
- Conduct web-based conferences or discussion threads to clarify and summarize technical information.

Title: **Widely Used and Accepted Modern Definitions (i.e., What Is a New Water Source?)**

Originator: **Jones**

Category of Information Description:

How do we define a new water source? We need common terms and an understanding of these terms.

Is contact with nature the only way to become new again? Can't technology replace nature?

As technical terms, we have "potable," "non-potable," "Title 22," and "recycled water." We have "reverse osmosis" (RO) and "microfiltration." We need to further define these terms for the public to understand in lay terms.

Importance:

There is a basic distrust of science. Costs and time are higher when technology cannot be trusted. We need to level the playing field. We need to be able to communicate with all people (the public) with words that are self-explanatory.

People do not understand the fine differences within treatment levels. "Yes," "No," "potable," "non-potable" are easy words.

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How Can This Category of Information Be Better Conveyed to Policy Makers?

- Education.
- Let the media help.
- Educate public figures.
- Lobby governmental agencies to make search findings.
- NWRI, WateReuse Association, American Water Works Association, Association of California Water Agencies.

Within our own community develop further words – RO = pristine water, potable = first water - source of water, etc.

West plant versus scalping plant.

Title: **The Public Lacks Basic Knowledge of the Water Industry and Issues**

Originator: **Kinshella**

Category of Information Description:

Recent surveys of the public in the Los Angeles, Phoenix, and Tucson areas indicate that the public has little more than a rudimentary knowledge about water and water quality. They do not know whom to trust for information. They do not place a lot of trust in anyone. Water engineers, universities, and the county health agency are above average in holding the public trust. The newspaper, U.S. EPA, and city council are below average in holding the public trust.

The public does not have a good source of reliable information on which to become knowledgeable and form an opinion. This results in the public opinion going along with an emotional appeal when a hard decision needs to be made. Two or three determined people can mobilize the masses against a project. The real motive of these people may not be associated with the arguments they are making. They may use good information or misinformation in getting the public to support their cause.

Importance:

The only way good public decisions can be made on a consistent basis is with an informed public. We cannot continue to only try to do "public involvement" on a project-by-project basis. The water industry has to utilize more resources in our interaction with our customers and the "impacted public." The public will agree to a project if they believe that it is important to do the project, that it is the right project, that we are the right organization to build the project, and that now is the time to build this project.

How Can This Category of Information Be Better Conveyed to Policy Makers?

This program would start with a more extensive public survey to get a better understanding of the public's lack of knowledge. Education programs and means of delivery could then be developed to bring better awareness and more accurate knowledge to the public.

Title: **Use of Health Effects Data in Assessing Risks of Drinking Water**

Originator: **Macler**

Category of Information Description:

Information on drinking water contamination and contaminant health effects are often misunderstood and frequently miscommunicated in public discussions. Health data are distinct from risk assessments, for example. Uncertainties, data gaps, and unknowns are, typically, inappropriately used and discussed.

Importance:

When faced with poorly described information, decision makers may ignore the information completely, assume the worst, or inappropriately use the information to justify decisions based on other criteria.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Direct educational programs to the needs of listeners

Title: **How Safe is Safe Enough? – Demystifying Health Risk Assessment**

Originator: **McDaniel**

Category of Information Description:

The public sees health risk assessment as a black box—bunches of assumptions go in and, at the end, the answer comes out – SAFE!

Importance:

The mystery of the "black box" leads the public and policy makers to either blindly trust or distrust the result largely based on the credibility of whoever delivers the result. Those who "believe" in risk assessment are unwilling to talk about the assumptions that went in and are even more unwilling to talk about the uncertainty about the final results.

How Can This Category of Information Be Better Conveyed to Policy Makers?

There needs to be better inclusion of the "non-technical public" in the design stage of a risk assessment – buy-in on assumptions, methodology, even hiring "experts" for under-represented groups, like the Technical Assistance Grants given to communities around superfund sites.

Title: **What Is Reality?**

Originator: **Trezos**

Category of Information Description:

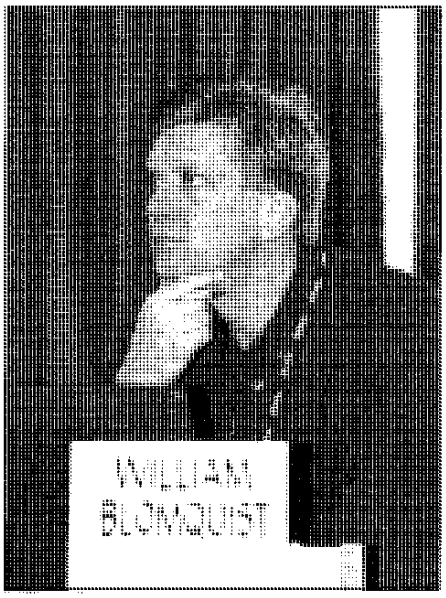
The squeaky wheel gets the grease. Most "vocal" groups influence the decision-making process. Groups can be "vocal" by actions and demonstrations, or by making political contributions. Typically, the first group is made up of the so-called environmentalists while big corporations belong to the second group. On any issue, the most difficult category of information that water policy makers have to assess and understand is the true opinion of all the constituents

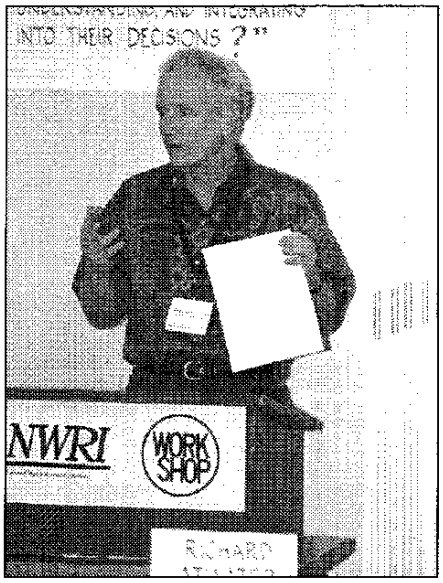
Importance:

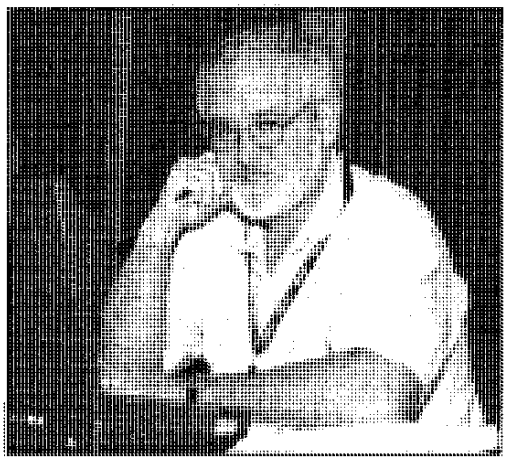
Lack of measure allows extremes to prevail. Environmentalists can place a halt to the economy or corporations may become gross polluters. Regulators can shift from one extreme to another. Example of quantification: number of groundwater contamination cases closed by the Water Board in the mid '90s.

How Can This Category of Information Be Better Conveyed to Policy Makers?

This is a two-way communication. First, it requires public education. We need concerned and knowledgeable citizens who can form their own opinion before they express it. Then, we need a mechanism for citizens to provide feedback. In the past, we used public hearings, political campaigns, etc. The drawback of these methods is that, sometimes, they do not reflect the reality of the situation and the squeaky wheel gets the grease. The Internet is a big hope in that it can provide a mechanism for knowledge assessment and management.







PRIORITY 5

Information About What Others Are Doing

ORIGINATOR:

Blomquist on behalf of himself, Atwater, Conklin, Rowe, Trezos, and Withers

The following categories of information were consolidated under the above title:

Title: **Information About What Others Are Doing**

Originator: **Blomquist**

Category of Information Description:

The difficulty here is accessing information, rather than understanding it. Water-policy makers at any level of government are, of course, aware of their own water challenges and their efforts to meet them, but they often toil in ignorance of what others are doing or have done to meet the same challenges. This is probably not due to the lack of information availability, but to the difficulty in finding it with minimal expenditure of additional time and effort.

Importance:

Water policy makers who lack information about what others are doing labor under at least two major difficulties that can produce significant errors or losses. The first and most obvious difficulty is that they miss vital information about lessons learned elsewhere and, therefore, may expend valuable resources, unnecessarily repeating those learning processes. The second and probably less damaging difficulty is that water-policy makers in a particular community or region may be deluded into thinking that they are "the first," or breaking new ground, on some activity or project when they are not.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Electronic or other clearinghouses, in accessible format and language, briefings, newsletters, workshops.

Title: **Access Historical Experience, Data, and Knowledge**

Originator: **Atwater**

***Category of Information Description*:**

Archive knowledge, experience, and institutional expertise. Policy makers need to be able to access concise information on the history of a policy issue.

Importance:

- Term limits (turn over of elected officials).
- Professional mentorship.
- Do not "reinvent the wheel."
- Build upon previous experience on similar problems.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Training. NWRI and other researchers need to compile historical experience (data, information, and expertise) in an easily understandable description of historical water problems.

Title: **Has Anybody Else Successfully (or Unsuccessfully) Responded to This Issue?**

Originator: **Conklin**

Category of Information Description:

Let's not constantly re-invent the wheel in this knowledge community.

Has this issue, problem, or challenge been encountered before? By whom? What did they do? Were they successful? Where are they now? Can I access their intellectual capital somehow?

Importance:

Without this sharing of information, the community of water professionals could be constantly re-inventing the wheel – and possibly repeating old mistakes, extending timeliness unnecessarily.

How Can This Category of Information Be Better Conveyed to Policy Makers?

If, by addressing this issue, the water community were able to create a knowledge classification scheme that received widespread acceptance, the sharing of information would likely become much easier.

Create a "knowledge classification scheme" that is accepted as a standard by all practitioners and ensure that all research funders require that researchers and practitioners identify the knowledge categories for their undertakings. These could include:

- Central web-based resource showing all research that has been completed, and the results produced.
- Central bibliography that is maintained over time.
- Expertise yellow pages.
- Conferences, gatherings.

Title: **Update and Share Water Resources Knowledge Within Multiple Professions and Categories of Careers and the Public/Policy Makers**

Originator: **Rowe**

Category of Information Description:

The constant challenge to update our brains...information/data is brain-stored and conclusions fit with the data that make sense. As new data is available, humans have to reassess their conclusions and update them to fit the new data, or not. Humans are often too busy with their own lives and data needs to grasp new data not directly relevant with their concerns.

Water resources folks work on different planes of thought. Technical professionals fresh out of college progress through their careers by relying on their college education for obtaining a job and doing interesting technical projects. Members of corporate management and public agencies, not necessarily technically grounded, discuss water-resources issues on policy and management fields. Decisions that proceed down a path depend on scientific, engineering, management, and policy ideas merging together and being shared.

Importance:

Continuing education accessibility can be accomplished through public meetings (formal and informal), e-mail communications, the establishment of web sites, and linking to updated data and sites.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Push technology newsletters accessibility to key websites. Policy makers need to be computer savvy. This will change over time as younger members who are comfortable with computers will access e-mail and web information.

Require continuing education and conferences for policy makers and technical professionals on old and current issues.

Title: **Value of Technology Transfer**

Originator: **Trezos**

Category of Information Description:

The value of a well is assessed when the well gets dry. The same applies to electricity! We take electricity for granted, and we come to a phase of denial when there is not enough power, and somebody (power company or state officials) has to enforce the rationing of power use.

Importance:

A lot of resources are wasted in duplication of research. A scientist from a different discipline may already have the solution to a water resources problem! We need a communication person to facilitate the communication.

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Diversification of peoples' skills.
- Workshops that bring people from different disciplines together.

Title: **Benchmarking Data on a Real Time Basis for Agencies of "Like Kind" and for "Best of Class"**

Originator: **Withers**

Category of Information Description:

There is an ongoing need for policy makers to know they are "on target" with projects and costs or are "investing" in areas of importance.

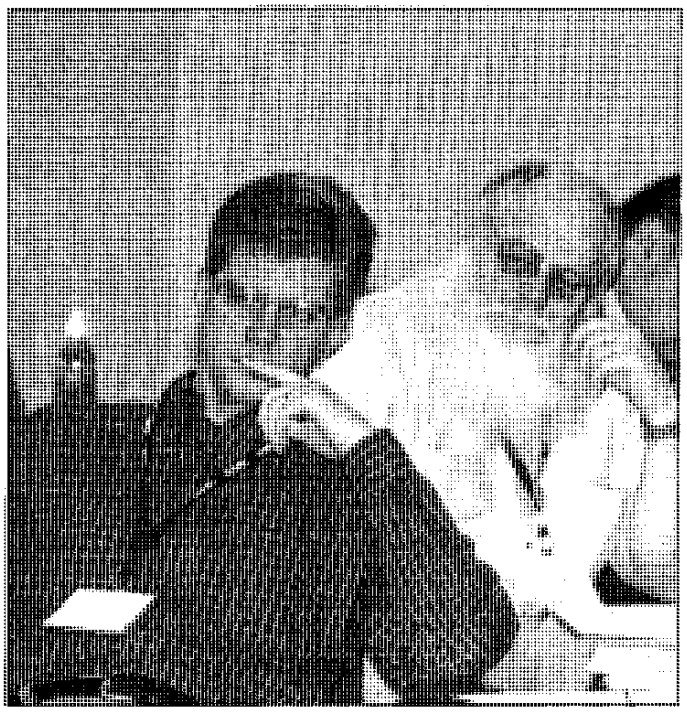
Areas for data could include a "dashboard" of key performance measures – financial performance, operational measures, measure of customers' satisfaction, etc.

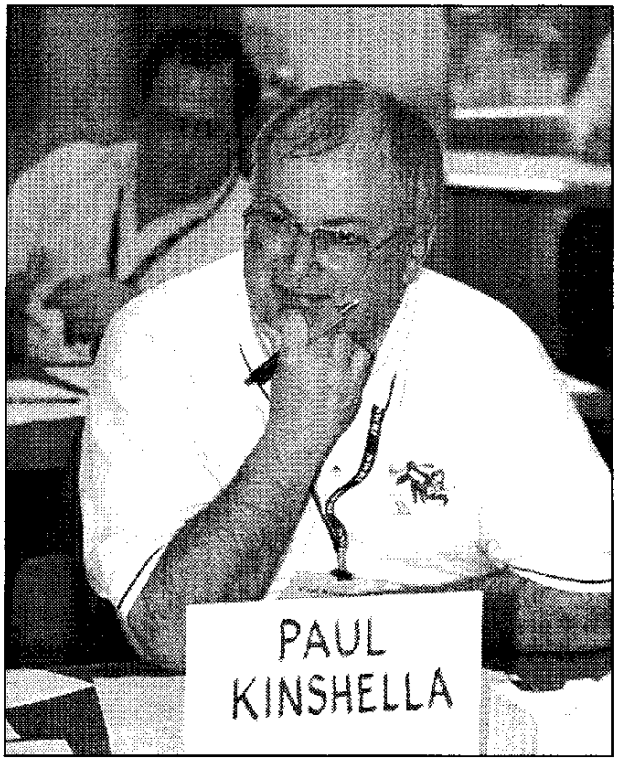
Importance:

Access to data will allow policy makers to validate decisions. Additionally, this information can help policy makers make their agencies closer to those "best in class."

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Create a database for policy makers to access links to other sites.
- Association of California Water Agencies (ACWA) and California Association of Sanitation Agencies (CASA) could prepare questionnaires on staffing and district information.
- Consulting firms can share cost data basis.

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PRIORITY 6

The Valuation of Water As an Asset

ORIGINATOR:

Blomquist on behalf of himself, Brown, and Kinshella

The following categories of information were consolidated under the above title:

Title: **The Valuation of Water As an Asset**

Originator: **Blomquist**

Category of Information Description:

Not only policy makers but also researchers and consultants have had difficulty understanding how to describe and quantify the value of water. The valuation process itself is a category of information that policy makers have difficulty grasping and applying, in large measure because there are few, if any, good models from research to use. Apart from the endlessly repeated Ben Franklin aphorism that "When the well runs dry, we know the worth of water," in virtually all other circumstances, we don't.

Importance:

Jurisdictions that do not know how to evaluate water as an asset have a much harder (perhaps impossible) time making sound decisions about whether and how to invest in its development and protection. There may be over-investments in projects that exploit comparatively "cheap" water supplies; there may be under-investments in projects or programs that would protect supplies or develop newer and more sustainable ones.

In addition, policy makers who have not been able to value water as an asset are at a significant disadvantage communicating with their constituents about the benefits their community, region, or nation will experience as a result of investments in water development or protection.

The difficulty in quantifying the importance of this issue is that, in the absence of better methods of valuing water, we simply do not know whether and to what extent excessive or insufficient investments are being made.

How Can This Category of Information Be Better Conveyed to Policy Makers?

NWRI and others should go beyond promoting the importance of valuing water and support some demonstration research projects that would develop and apply valuation methods in real settings to provide some examples for wider use.

Title: **How Do You Set Rates When You Don't Know What the Provider Is Going to Charge You?**

Originator: **Brown**

Category of Information Description:

The City of Buena Park is the water distributor for residential and business customers. The City Council sets the rages for the Water Enterprise fund. We purchase water from the Southern California Metropolitan Water District and the Orange County Water District.

Both providers set rates at different times and usually after we have to set our rates. This sets up a best guess for the City when we set our rates, which we base on the range, that the providers feel they may raise their rates.

Importance:

When setting the water rates, we usually face the choice of using the high end of the providers' range and incurring irate ratepayers at public hearings, or using the low end and running the Water Enterprise Fund at a deficit.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Obtain information from both buyers and sellers on what they base their water rates on and develop a model that could be used by all agencies. Attempt to have all agencies set their rate setting at the same time period even if it is off the regular budget cycle.

This could be handled a water agency or the regional planning organization.

Title: **Policy Makers (and Most Others) Do Not Properly Value Water.**

Originator: **Kinshella**

Category of Information Description:

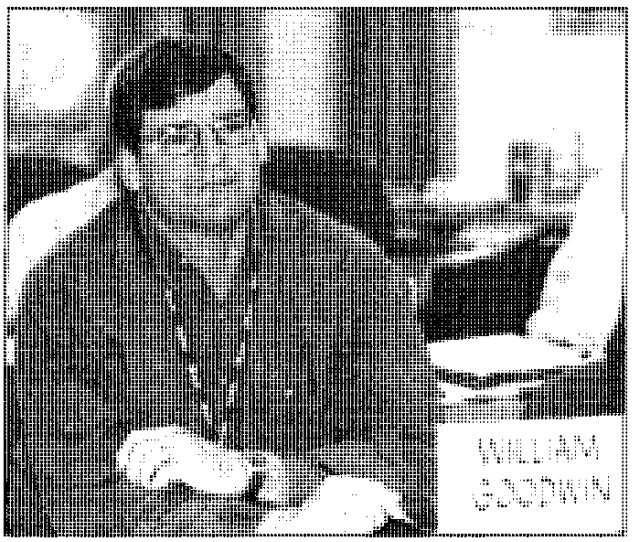
Water is a limited resource. Water of a sufficient quality to make into potable water is even more limited. Policy makers (rate setters) do not want to the best water that technology can produce; rather, they approve water rates for the best water quality they feel we can afford.

Importance:

- Nearly all of the water policy decisions are constrained by "the cost."
- The "public" wants the best water quality until they are at the point of a rate increase, then cost becomes a major factor for the decision.

How Can This Category of Information Be Better Conveyed to Policy Makers?

We need to have more public involvement and education relative to the "value" of water versus the "cost of water."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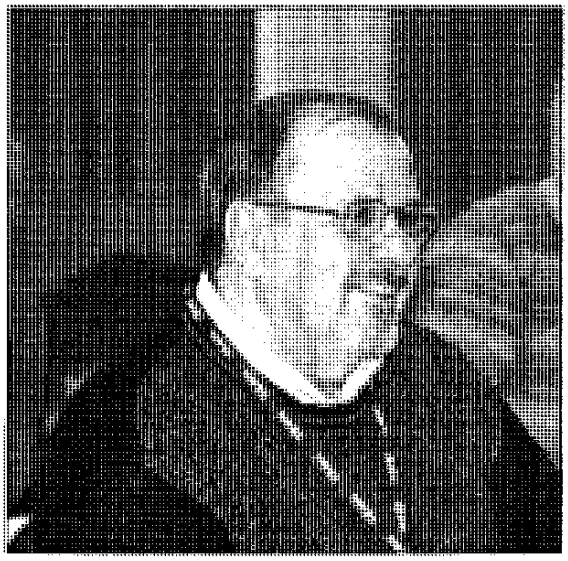


PRIORITY 7

Appropriate Technology to Invest in Today to Meet Tomorrow's Regulations

ORIGINATORS:

Goodwin on behalf of himself, DeMarco, McDaniel, and Sakaji

The following categories of information were consolidated under the above title:

Title: **Appropriate Technology to Invest in Today to Meet Tomorrow's Regulations**

Originator: **Goodwin**

Category of Information Description:

Major infrastructure investments are being made to provide additional water supplies for a growing population and to bring existing supplies to current water-quality standards. Some level of confidence is needed that the technology of today will meet the regulatory requirements of tomorrow.

Importance:

Communities are currently faced with investment decisions to bring their water supplies to current standards. With competing needs for public money, the technology must be cost effective today while providing an adequate benefit for the term of the investment.

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Database of current solutions to various problems.
- Investment in model projects by federal government with assimilated results.
- Use of consultants.
- Regulatory decisions based on a balanced scientific viewpoint, and not on emotional reactions.

Title: **Future Infrastructure Needs Caused by Federal/State Regulations**

Originator: **DeMarco**

Category of Information Description:

Federal regulations dealing with major items, such as disinfection resistant organisms, lead concentrations in tap water, radon, etc., present a major set of infrastructure decisions for water policy makers. Questions relating to optimal methods for coping with various contaminants singularly, or as a large coordinated threat to the public, pose puzzling situations. What are the risk/benefit conditions and knowledge base that exist, and how are the budgets to be obtained?

Importance:

High. The lack of multi-contaminant research solutions tends to cause a great deal of stonewalling by policy makers before implementing needed technological improvements.

Lead, microbial, and disinfection byproducts cause increased problems while solving others. This often causes reluctance by policy makers to implement Federal recommendations until the last possible moment waiting for another "shoe to drop" (i.e., what impacts will the new contaminant candidate listing cause?).

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Perform multipurpose demonstration projects.
- Gather data in-house, or from similar matrix waters that place into perspective the "bang" obtained from the capital improvement program funding sought.

Title: **Site Specific Performance Results of Best Available Technology**

Originator: **DeMarco**

Category of Information Description:

Regulations are promulgated on the basis that there is a reasonably cost-effective technology available to meet the regulatory requirements. Often times (or most times), the efficacy of technology is not universally tested, yet it is the basis for defending regulations that cost millions or billions of dollars to the general public – the fount of all dollars.

Importance:

The lack of information for specific utilities may mean that a technology is implemented that will NOT achieve the desired results, yet considerable public monies may be expended. Such white elephants are catastrophic in maintaining credibility of the policy makers. The federal/state regulators do NOT share the blame for such problems and loss of confidence.

How Can This Category of Information Be Better Conveyed to Policy Makers?

A number of utilities have coordinated research that places the efficacy of a given unit process in perspective. Examples: ozone results for *Cryptosporidium* inactivation; Concentration x Contact Time tables for disinfection; current attempts to conduct multi-utility lead service branch projects for the remediation of lead in furnished tap water. Multi-city ultraviolet studies in parallel conduct with some protocols. This is meant to provide ranges of effectiveness of various methods.

Title: **Drinking Water Distribution Systems – The Next Big Frontier**

Originator: **DeMarco**

Category of Information Description:

The result of increasing treatment requirements is great water quality, but we put in pipes and mains we do not know much about. As regulations move toward measurement at the tap, we may find surprises that we will not like.

Importance:

Millions of miles of pipe exist, and many distribution storage tanks are relied upon to maintain our quality to the consumers' final use. No one truly knows how to design these distribution systems other then to meet quantity and fire demands, certainly NOT water quality maintenance.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Do not allow regulation at the tap until we understand what problems may exist with out current system.

Title: **When Systems Fail – Talking About the Stuff Nobody Wants to Talk About**

Originator: **McDaniel**

Category of Information Description:

The discussion of risk from the point-of-view of public agencies tends to be geared toward "we've engineered the risk out." The public wants to know: What happens if the system fails? How soon will you know? How will you let us know? How will you protect my family and me from contaminated water?

Importance:

Admission of the potential for system failure increases credibility— a concept that is counter intuitive for many. The general public may not have lots of technical expertise, but they are experts on the potential for human error.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Expand the discussion of "layers-of-protection" on the front end to include what can go wrong on the back end. The public and policy makers want to know that the agency is considering the "what if's" and has a back-up plan.

Title: **The Strength and Integrity of the Multiple Barrier Approach as Applied to the Delivery of Potable Water**

Originator: **Sakaji**

Category of Information Description:

The traditional approach to maintaining and ensuring the delivery of potable water has been to establish multiple barriers between the source and the consumer. Traditionally, these barriers are placed in the watershed, treatment, and distribution system. Each of these barriers can be viewed as a control point. In theory, reducing the strength of one would result in the strengthening of other barriers. The greater pressure to develop watersheds and to lower disinfectant residuals places a greater reliance on treatment.

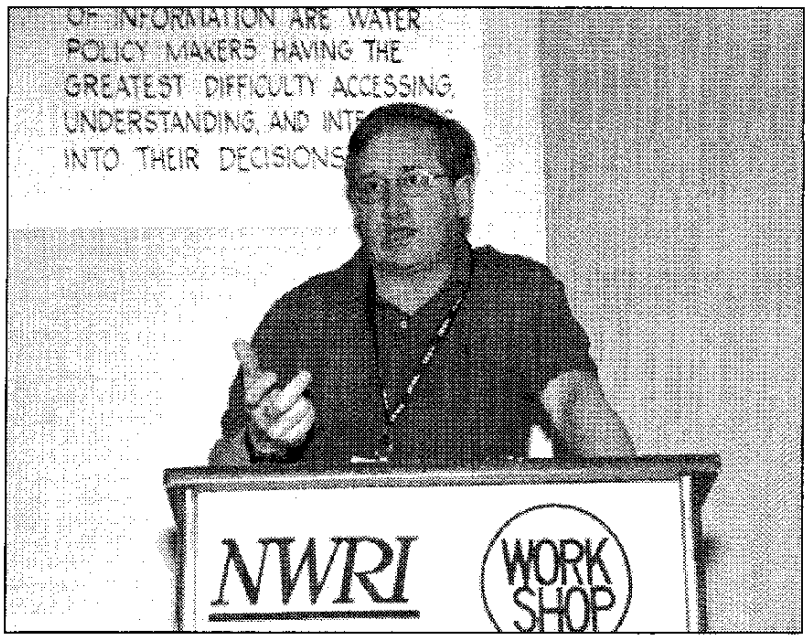
- How good is each of the barriers?
- How does constructing process trains impact the overall performance of the barriers?
- What units should not be placed in front of the other?

Importance:

High.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Develop a fault tree analysis process for each unit process and overall treatment train.


OF INFORMATION ARE WATER
POLICY MAKERS HAVING THE
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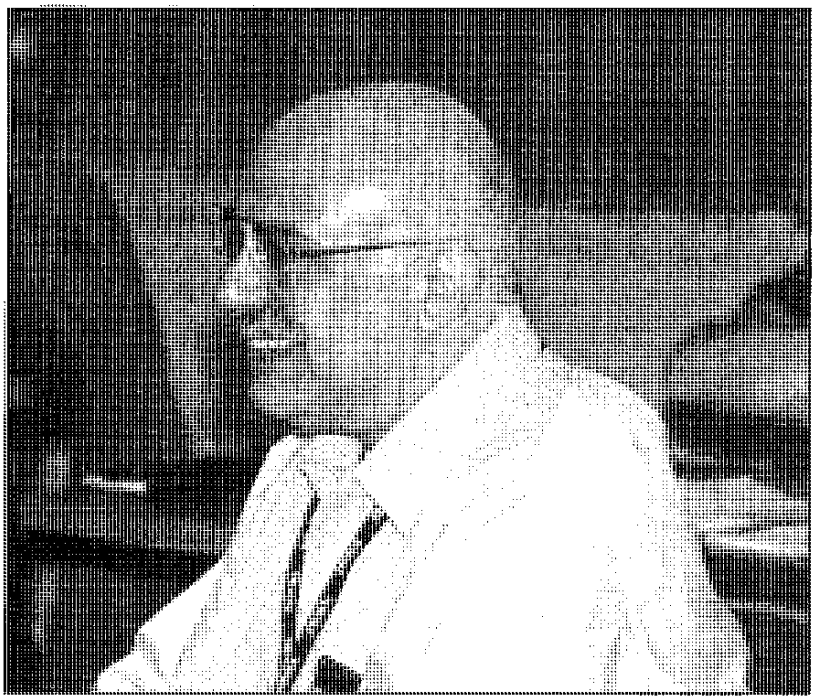


PRIORITY 8

Equip Policy Makers with Legislative, Regulatory, and Financial Knowledge

ORIGINATORS:

Withers on behalf of himself and Schiller

The following categories of information were consolidated under the above title:

Title: **Financial and Economic IQ Education**

Originator: **Withers**

Category of Information Description:

Senior staff and board members continually make decisions involving financial concepts. Frequently, a complete understanding or consideration of options is lacking. Too often, specific vendors are pushing their approach, which may not be in the best interests of the agency. Also, policy makers need to present financial information/reports in an organized and understandable format—standardization of reports.

Importance:

The misapplication of sound financial criteria costs water utilities billions!

How Can This Category of Information Be Better Conveyed to Policy Makers?

Continue to work with industry groups, like Municipal Finance Officers, Securities Association, and others to build a financial and economic I.Q.

Title: **Statutory/Regulatory Context of Water Policy**

Originator: **Withers**

Category of Information Description:

Water policy makers operate in a complex statutory and regulatory environment. They must understand the basic concepts of key legislation if they are to be effective leaders. Examples include district-enabling legislation, the National Environmental Protection Act (NEPA), California Environmental Quality Act (CEQA), Porter-Cologne, Knox-Cortese, Clean Water Act, land-use regulations, government statutes and codes, water resource statues, and Title 22, among others.

Importance:

If policy makers do not understand the basics, they can launch ill-advised projects and spend dollars on legal/consultant help frivolously.

How Can This Category of Information Be Better Conveyed to Policy Makers?

New board member/senior staff orientation needs to be enhanced. A handbook could be prepared with help of associations/academia.

Title: **Understanding Cooperative Funding Projects Leveraging Money Among Levels of Governments Better Serves Constituents' Needs for a Sustainable Supply**

Originator: **Schiller**

Category of Information Description:

Have to pragmatically think outside the jurisdiction for funding solutions in the local interest. There has been a decrease in Federal EPA and states' funding programs over the last 20 years. While needs increase, there is a necessity for local governments to influence state legislation to enable inter-local "deals" and to promote an increase of matching funds in federal programs as well as enabling legislation to create local impact fees and special taxing districts.

Importance:

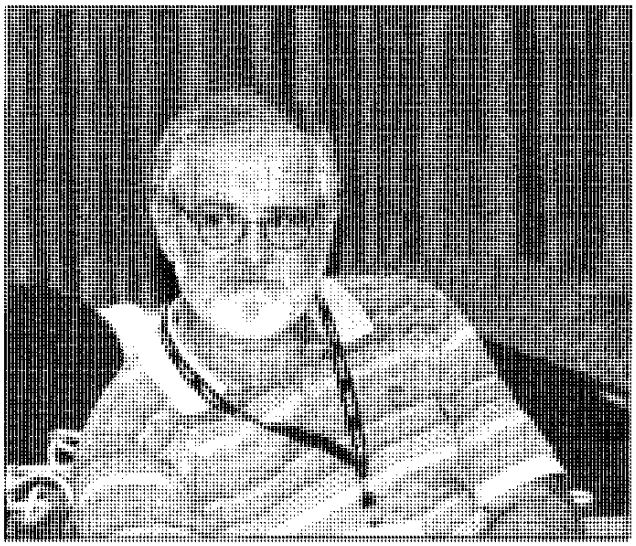
Differing abilities of local areas to meet U.S. EPA, state, and local project needs with local funds. In the end, projects are "often about money, not water." Need to facilitate economy-of-scale "deals" and creative solutions with collective funding solutions to develop sustainable supplies while protecting citizens and the environment.

The Southwest Florida Water Management District (SWFWMD) is leveraging one billion dollars worth of sustainable projects in the district by 2007 and proposes another billion by 2020.

How Can This Category of Information Be Better Conveyed to Policy Maker?

- Need to illustrate successful public/public, private/public, and other successful programs utilizing a cooperative funding leveraged approach.

- Need website links to the International City/County Management Association (ICMA), LGEAN.



PRIORITY 9

Integrate Plans for Land Uses and Water Resources

ORIGINATORS:

Rowe on behalf of himself, Albiani, Dickinson, Gaither, and Kinshella

The following categories of information were consolidated under the above title:

Title: **Land Uses and Water Resources Planning Changes**

Originator: **Rowe**

Category of Information Description:

The value of natural elements should be better quantified in relation to benefits obtained through the redevelopment of an area. There is a need to incorporate more land-use planning for water resources conjunctive-use facilities. Many urban areas developed lands through short-term objectives. There are many public benefits to natural elements remaining and enhanced for long-term management and quality of life objectives. For example, as the population grows in an area, additional water supply wells are needed along with facilities, such as percolation basins to capture an increasing amount of local and imported water and recycled water. Cities often do not plan for small areas for new well locations let alone much larger areas for groundwater recharge. Besides these basic infrastructure needs for water supply, densification of communities reduce the amount of land used for recreational and ecological purposes. The values of the natural elements to infrastructure, recreation, and ecology should be better quantified for prioritizing areas for water resources and land uses. Plans should include re-evaluating existing land uses toward potential changes to better long-term goals. What is the value of a rare 300-year-old tree... maintaining or changing/improving an eco-system...what are the mitigation measures? Are they worth it...or should there be a greater payback to society?

Importance:

Valuing water resources and land-use planning as interdependent systems is becoming more important. Communities are understanding the benefits of improving natural ecological systems for multiple benefits. But at what price? And who pays?

How Can This Category of Information Be Better Conveyed to Policy Makers?

A state legislative policy on land uses to enhance water resources for ultimate buildout.

Guidelines establishing decision-making on land-use policies based on hydrology, the established and future infrastructure, and hydrogeological conditions.

Recognition that there will be a greater dependence on groundwater for treatment, storage, and distribution of water supplies.

Title: **Land Use and Resources Planning Changes While Recognizing Traditional Values**

Originator: **Albiani**

Category Description:

Much discussion has revolved around land-use planning and water resources. "Better land-use planning upstream will help solve our problems downstream." While this is often correct, people should not sacrifice fully realizing their property rights because bad land-use decisions were previously made.

Importance:

The value of recognizing private property rights cannot be understated. The United States' dominance in the high-tech industry, agriculture, and aerospace, among other areas, is the direct result of rewarding ingenuity as well as efficient and productive resource use.

How Can This Category of Information be Better Conveyed to Policy Makers?

- When a problem arises, commission additional research into how the problem was created.
- Educate the policy makers regarding the need to continually recognize the value of private property rights.

Title; **Water Supply Implications of Local Land Use Changes**

Originator: **Dickinson**

Category of Information Description:

Traditionally, planning and zoning agencies make their decisions based on local economic factors or political pressures. Very rarely is sufficiency of long-term water supplies or long-term water quality issues a factor in evaluating development projects. Even in water-short California, the general planning process required by state law does not incorporate water as a mandated element.

Importance:

As growth continues, the impact of that growth on available water supplies is not being well measured or planned for. Local planning processes are not tempering their growth based on any long-term expectations for supply procurement. As a result, we may be headed for serious conflicts within 30 to 40 years, where even the alternative supplies currently being planned will not be adequate to accommodate the shortfall. Beginning major remedies, such as desalination, with the significant energy and infrastructure capital investments needed, will be too late by then.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Legislation has been enacted in various forms (SB 901), but none that has had enough of an impact in this planning process. At a minimum, State legislation needs to be enacted in California to require a Water Planning Element in the general planning process of the Planning Code. In other states, similar legislation should be considered, if not already required.

Title: **Profound Impact of Population Growth on Water Policy**

Originator: **Gaither**

Category of Information Description:

Water policy is driven by the increase in the number of consumers and the services/products they require.

Importance:

Most water policy decisions deal with "solutions at the margins." The fundamental driver in water policy is the increase in the number of consumers whose demands must be met.

How Can This Category of Information Be Better Conveyed to Policy Makers?

This is a very difficult political issue. Target organizations include the Catholic Church, the Church of Latter-Day Saints (Mormons) and pro-immigration lobbies. The best way to bring this issue to public attention is to continually raise the centrality of population growth to water policy.

Title: **What We Need Is a Good Drought**

Originator: **Kinshella**

Category of Information Description:

The "hydro-illogical" cycle impacts our project planning. Many projects that are deemed acceptable when we are very short of water are not acceptable to the public when you have access to the your average or above-average water supply.

Importance:

Policy makers often look at a very short (in water-planning terms) timeline. This timeline is often the next election. Water policy needs to be based on periods of 20, 50, or 100 years. Funding for what you have to do next year is hard to acquire; funding for 20 years from now is often impossible.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Water organizations and leaders must make the policy makers aware of the critical requirement for long-term planning in developing water supplies for the future. Many projects are started in a drought but die when the drought is over.

PRIORITY 10

Global Concerns for Water Need to Be Identified and Communicated

ORIGINATORS:

Jones on behalf of herself, Gaither, Goodwin, Schiller, and Trezos

The following categories of information were consolidated under the above title:

Title: **Global Concerns for Water**

Originator: **Jones**

Category of Information Description:

How far away or how far up stream do I have the right to control my water? Should I be able to tell my neighbor how to use and treat water before I get the same source?

Importance:

- Water usage is limited for some just because of the downstream interests imposing demands.
- Buy-in leads to expense for whom?

Projects become cost prohibitive because of all the mitigated demands placed by downstream users. There should be a buy-in from downstream users to pay to protect its future product.

How Can This Category of Information Be Better Conveyed to Policy Makers?

More global prospective, more communications between regions and neighbors. A source to go to, to see who is doing what. A central location for prospective project.

Title: **Profound Impact of Population Growth on Water Policy**

Originator: **Gaither**

Category of Information Description:

Water policy is driven by the increase in the number of consumers and the services/products they require.

Importance:

Most water policy decisions deal with "solutions at the margins." The fundamental driver in water policy is the increase in the number of consumers whose demands must be met.

How Can This Category of Information Be Better Conveyed to Policy Makers?

This is a very difficult political issue. Target organizations include the Catholic Church, the Church of Latter-Day Saints (Mormons) and pro-immigration lobbies. The best way to bring this issue to public attention is to continually raise the centrality of population growth to water policy.

Title: **Benefits of Regional Cooperation in Water Supply and Treatment**

Originator: **Goodwin**

Category of Information Description:

Watershed basins or local hydrological zones are integrally linked. The value of reliability is difficult to quantify. Land-use decisions by adjoining jurisdictions have regional impacts on reliability supply and water quality. Empirical data on the cost of watershed degradation and incremental increases in treatment costs should be included in land-use decisions. Policy makers need to understand the impact of their decisions on those downstream as well as in-basin.

Thinking regionally results in better use of resources and increased reliability. However, avoiding impacts by foregoing job creation opportunities needs to be valued. The benefactors should compensate the community for this value.

Importance:

The economic strength of most California cities is dependent on commercial and industrial growth. How do we balance this need with avoidance of impacts? To encourage changes in the decision process, a mechanism is needed for sharing the cost of foregoing economic growth. Potentially, a mechanism such as economic development banking, similar to mitigation banking, could be created.

How Can This Category of Information Be Better Conveyed to Policy Makers?

This discussion must include economists, planners, the public, and politicians, possibly through an organization such as the California League of Cities.

Title: **Step "O": Value of In-school and Public Education as an Investment to Protect and Provide Sustainable Water Resources**

Originator: **Schiller**

Category of Information Description:

All levels of policy makers often consider "education" programs as a frill. Without education programming, much misinformation continues unabated. Hard to create support for solutions. Need to communicate in plain English. Need to start in the first grade. Need K-12 curricula and teachers to train other teachers. Need interactive local websites and feedback loops.

Importance:

Need to explain that "doing nothing" is not an option. Without on-going educational efforts, public officials will feel frustration at the lack of public interest and the water crisis they were often blamed for. Inaccurate media coverage and misinformation continues. Need to educate government policy makers that this cannot wait until later for the public to understand.

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Need interactive websites and prototypes. International City/County Management Association (ICMA) and the K-12 curriculum and website-based conservation campaign and database at Southwest Florida Water Management District (SWFWMD). Public education programs help policy makers better meet their statutory obligations.

- National Water Resources manual and user committees to share best practices

Title: **Technical Information and the Environmental Ramifications of a Policy**

Originator: **Trezos**

Category of Information Description:

In the environmental arena, we often rely on levels of acceptable risk. Toxicologists and statisticians use their own jargon to address an issue. Policy makers may not have the technical background to understand the issue but, nevertheless, they adopt a policy without fully understand the ramifications of the policy they are adopting.

Importance:

The lack of understanding technical data leads to sub-optimal solutions. It may cause the waste of resources or negative environmental impacts. In the case of water resources, scientists often may not agree on health and environmental issues. For example, how bad is methyl tertiary butyl ether (MTBE)? How clean is clean?

How Can This Category of Information Be Better Conveyed to Policy Makers?

There may not be an answer to this question. The complexity of technical data makes an issue political rather than scientific. A direct analogy is the speed limit. There is the perception that the lower the speed limit, the safer the roads. In California, the speed limit is 70 mph; in Arizona, it is 75 mph; and, in Germany, it doesn't exits. Are California's roads safer than Arizona's? You can hire the statistician of your choice to prove any result you want. Some Germans want to adopt speed limits while, for others, the lack of speed limits is part of their national pride.

PRIORITY 11

Forecast Project Policy Effects in Light of Prospective Change and Uncertainty

ORIGINATORS:

Blomquist on behalf of himself, Kinshella, and Rowe

The following categories of information were consolidated under the above title:

Title: **Risk Assessment**

Originator: **Blomquist**

Category of Information Description:

Not only health risks, but also the risks of mechanical failure of water treatment and distribution systems and the risks of economic downturns or other changes in financial conditions, affect water policy decisions. The difficulty water policy makers face is in accessing, understanding, and integrating risk information into their decisions.

Importance:

Difficulty in accessing, understanding, and integrating risk information into water-policy decisions compounds mistrust, gridlock, and the possibilities of significant errors in either over-investing or under-investing in regulatory protections, infrastructure redundancy, financial reserves, etc.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Yet another addition to the curriculum for new water policy makers.

Title: **How to Incorporate Uncertainty Into Forecasting**

Originator: **Blomquist**

Category of Information Description:

All water-policy actions—from regulations through concrete projects—entail explicit or implicit predictions over 5, 10, 30, or some other period of years. Therefore, decisions about those actions necessarily engage the question of uncertainty, since the future is not entirely knowable. The difficulty for policy makers is in accessing, understanding, and integrating uncertainty into their decisions—and in knowing how uncertainty has been incorporated into forecasts by those who are advising them.

Importance:

- Lack of understanding about how to deal with uncertainty increases the room for disagreement, among policy makers, their staff and other advisors, and their constituents.
- Paralysis—in the face of uncertainty and disagreement, policy makers may respond by delaying or deferring decisions, to their community's detriment.
- If policy makers forge ahead, not knowing how to address uncertainty about the future or not knowing how it has been addressed by those who are advising them, their chances of making mistakes increase.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Uncertainty and forecasting could be integrated into the curriculum of the handbook or orientation workshop for policy makers, and policy makers should require their staff and advisors to be more explicit about how they incorporated uncertainty.

Title: **What We Need Is a Good Drought**

Originator: **Kinshella**

Category of Information Description:

The "hydro-illogical" cycle impacts our project planning. Many projects that are deemed acceptable when we are very short of water are not acceptable to the public when you have access to the your average or above-average water supply.

Importance:

Policy makers often look at a very short (in water-planning terms) timeline. This timeline is often the next election. Water policy needs to be based on periods of 20, 50, or 100 years. Funding for what you have to do next year is hard to acquire; funding for 20 years from now is often impossible.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Water organizations and leaders must make the policy makers aware of the critical requirement for long-term planning in developing water supplies for the future. Many projects are started in a drought but die when the drought is over.

Title: **"Environmentalist" Objectives and Perceptions Are Unclear and Change**

Originator: **Rowe**

Category of Information Description:

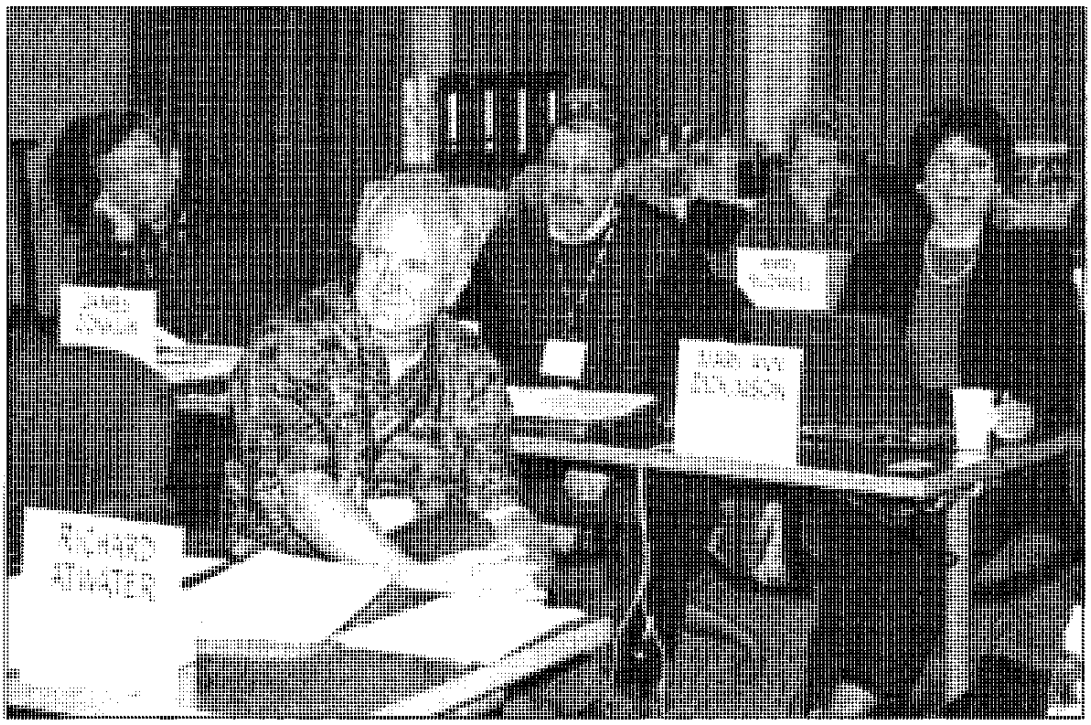
Non-government "environmental" organizations: Is this a case of "no growthers in environmental clothing" or a desire to change an area to a pristine and more "natural" condition? What drives the activist who does not trust authorities or is an alarmist striving to gain attention and monetary gains? Are public policies being made by attorneys interpreting and using poorly written and poorly understood legislations and regulations? Most everyone is a basic naturalist, recognizing water stewardship to exist/strive in an area.

Importance:

Value judgments need to be debated and weighted toward public-elected and appointed officials' decisions. Poor laws and regulations need to be revised to correct and address inadequacies.

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Conduct letter-writing campaigns to legislators and congressmen.
- Recognize and advertise the urgency of cases suggesting the need to legislate changes.



PRIORITY 12

Fund and Coordinate Interagency Baseline Data to Enhance Web-based Water Resource Management

ORIGINATORS:

Atwater on behalf of himself, Conklin, DeMarco, and Dickinson.

The following categories of information were consolidated under the above title:

Title: **Lack of State/Federal/Local Funding and Coordination of River Basin Information Systems and Data Collection**

Originator: **Atwater**

Category of Information Description:

Need to better coordinate baseline monitoring data and other information (land use) in a consistent Geographic Information Systems (GIS) centralized system. Sustained funding, of course, is critical.

Importance:

Water resources data and information need to be collected in a coordinated manner and archived in GIS computer systems.

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Annual summary reports on trends.
- Interpret data with clearly understandable graphics.

Title: **Web-based Information – There Is Too Much of It, and Much of It Is Unjuried and Unvalidated**

Originator: **Conklin**

Category of Information Description:

The web has become a repository for enormous volumes of valuable (and useless) information. We are starting to rely on the web as a quick and efficient way of accessing information. The information itself, however, is often simply "there" – unjuried, unvalidated, perhaps important and useful, or perhaps not. Also, in searching for information on the web, one cannot be sure that one has found the most useful or pertinent information.

Importance:

If decision makers and their support networks use the web to conduct research today, there can be no guarantee that they are basing their decisions on the most useful information. They will often be spending significant amounts of time on relatively fruitless tasks.

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Create a portal and manage the portal.
- Regularly view and validate information.
- Maintain, manage, and improve the information provided via the portal.

Title: **User-friendly National Drinking Water Database for Customers as Decision Makers**

Originator: **DeMarco**

Category of Information Description:

The public is generally dependent totally on central groups for getting information and for comparisons of results from city to city or nationally. With more sophisticated public computer users, there is no excuse for not providing them information on their and the nation's water quality. The effort should be no more difficult than shopping for a computer/car/etc.

Importance:

An informed public that can obtain its own information may, ultimately, bridge the gap between not knowing who to believe – the environmental protectionist side of the spectrum or the polluter side of the spectrum.

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Public data clearing house.
- Website that is user-friendly and cross-referenced to health benefits.

Title: **Fund and Coordinate Interagency Baseline Data to Enhance Web-based Water Resource Management**

Originator: **Dickinson**

Category of Information Description:

The Internet explosion has resulted in tremendous opportunities for water utility and water resource managers. The U.S. EPA has already recognized the need to get real-time watershed information out on the web to the public, and has embarked upon a special grant program called EMPACT to fund pilot projects for real-time monitoring going directly to the Internet with the opportunity for immediate real-time analysis. One EMPACT project is piloting automatic water-quality reporting directly from the field to the primacy agency. The California Urban Water Conservation Council has launched a database-backed website that is gathering water conservation program information from water agencies statewide and rolling up the data into a report for the State Water Resources Control Board. If water efficiency will indeed be "certified" under CALFED (and, therefore, become regulatory), this Internet process will be the form of permit application and approval. Other regulatory agencies across the country are also considering Internet-based permit programs.

Importance:

The possibilities for using such Internet applications, both with regulatory agencies, and with the utility's customers, are limitless. Information can be disseminated instantaneously to customers (such as in the event of a water-quality emergency or distribution system failure) and data can be made readily available to regulatory agencies. Once the initial cost hurdle of building the system and entering the data has been overcome, significant benefits can be realized, both economic as well as management. In addition, ever watery utility's objective of public access can be easily realized. The concern for the utility is undue exposure, so the rules of confidentiality need to be well defined at the outset.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Discussions will need to occur between the regulated community and the regulators to determine suitable areas for internet-based coordination. State Legislatures will also need appropriate money for gathering baseline data that will be necessary for any meaningful analysis of real-time monitoring in watershed programs.

PRIORITY 13

Unfunded Mandates by Policy Makers Need to Stop!

ORIGINATORS:

Schiller on behalf of himself, Albiani, and DeMarco

The following categories of information were consolidated under the above title:

Title: **Unfunded Mandates by Policy Makers Need to Stop!**

Originator: **Schiller**

Category of Information Description:

Many policy makers at all levels, especially federal and state, pass laws requiring "other" levels of government to meet new mandated standards without providing funding or economic impact studies prior to passage.

Importance:

Creates continuous opportunities for failure, mistrust and litigation. Everyone loses.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Policy makers need to require economic impact statements and categorical funding sources before the passage of new legislation, ordinances, statutes, regulations, etc.

Title: **Understanding Cooperative Funding Projects Leveraging Money Among Levels of Governments Better Serves Constituents' Needs for a Sustainable Supply**

Originator: **Schiller**

Category of Information Description:

Have to pragmatically think outside the jurisdiction for funding solutions in the local interest. There has been a decrease in Federal EPA and states' funding programs over the last 20 years. While needs increase, there is a necessity for local governments to influence state legislation to enable inter-local "deals" and to promote an increase of matching funds in federal programs as well as enabling legislation to create local impact fees and special taxing districts.

Importance:

Differing abilities of local areas to meet U.S. EPA, state, and local project needs with local funds. In the end, projects are "often about money, not water." Need to facilitate economy-of-scale "deals" and creative solutions with collective funding solutions to develop sustainable supplies while protecting citizens and the environment.

The Southwest Florida Water Management District (SWFWMD) is leveraging one billion dollars worth of sustainable projects in the district by 2007 and proposes another billion by 2020.

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Need to illustrate successful public/public, private/public, and other successful programs utilizing a cooperative funding leveraged approach.

- Need website links to the International City/County Management Association (ICMA), LGEAN.

Title: **Economic Impact of Decisions by Federal and State Policy Makers on Those Affected**

Originator: **Albani**

Category of Information Description:

Local governments and businesses are impacted by decisions that are made with no recognition of any economic impact. The local entity, business, or consumer is left with the responsibility to pay the bill without the admission it is due to a state or federal policy.

Importance:

Very expensive rules are being made without a cost-benefit analysis.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Establish policies that mandate a cost-benefit analysis of every decision.

Title: **Future Infrastructure Needs Caused by Federal/State Regulations**

Originator: **DeMarco**

Category of Information Description:

Federal regulations dealing with major items, such as disinfection resistant organisms, lead concentrations in tap water, radon, etc., present a major set of infrastructure decisions for water policy makers. Questions relating to optimal methods for coping with various contaminants singularly, or as a large coordinated threat to the public, pose puzzling situations. What are the risk/benefit conditions and knowledge base that exist, and how are the budgets to be obtained?

Importance:

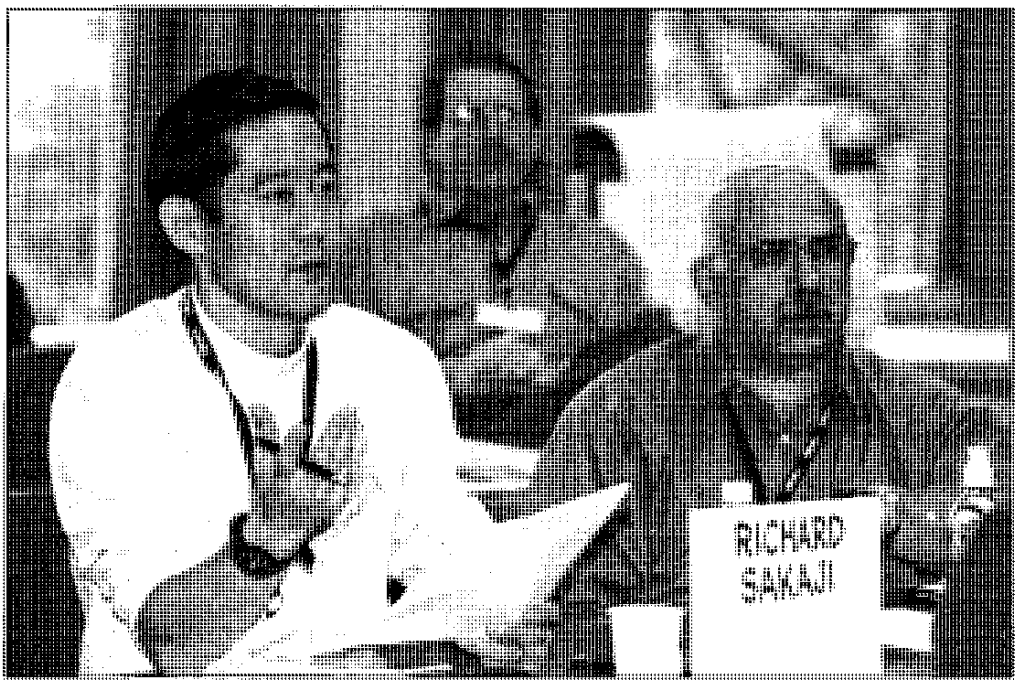
High. The lack of multi-contaminant research solutions tends to cause a great deal of stonewalling by policy makers before implementing needed technological improvements.

Lead, microbial, and disinfection byproducts cause increased problems while solving others. This often causes reluctance by policy makers to implement Federal recommendations until the last possible moment waiting for another "shoe to drop" (i.e., what impacts will the new contaminant candidate listing cause?).

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Perform multipurpose demonstration projects.

- Gather data in-house, or from similar matrix waters that place into perspective the "bang" obtained from the capital improvement program funding sought.



PRIORITY 14

Identify, Mitigate, and Communicate Risks Associated with Successful Public/Private Partnership Projects

ORIGINATOR

Schiller

Category of Information Description:

In the public sector, successful public/private projects require comprehensive project risk mitigation to meet the needs of all affected stakeholders: governments, citizens, lenders, customers, providers, and investors. Unless all public/private partnership stakeholder risks are identified, mediated, mitigated, and effectively communicated in the public sector, the timely development of water-related development projects will not be achieved. The public is worried, and experts and the lay publics see things differently. We need to better manage and facilitate collective decision making. Otherwise, we go from crisis to crisis in frustration and have limited success.

***Importance*:**

Need to establish a model for stakeholders to address comprehensive risk mitigation in complex public utility projects. We need to actively work to create the consensus necessary to develop needed new resources. While there are trade-offs, we need to communicate and manage situations with a medical-type "do no harm" frame of mind to combat the "better-safe-than-sorry" defenders of the status quo. All aspects of the process need to be equally addressed for a successful project delivery. There are no adversaries; we are all under one tent.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Use the Tampa Bay Water Seawater Desalination process as a case study to develop best practices for implementing public/private partnerships. Do an in-depth analysis of the risk mitigation treaties, contracts, mediation, and public relation efforts resulting in the approvals for the Tampa Bay Water Seawater Desalination Plant. Study the on-going activities necessary to develop best practice tools for others to imitate and innovate as other projects are created. Need to set-up a national website and links among local websites.

Note: Please refer to Appendix D in this report for (1) an Overview of Project Risk Mitigation and (2) a description of the Tampa Bay Water Seawater Plant.

PRIORITY 15

Ethical Leadership Principles

ORIGINATORS:

Withers on behalf of himself and Albiani

The following categories of information were consolidated under the above title:

Title: **Ethical Leadership Principles**

Originator: **Withers**

Category of Information Description:

Too often, decisions are made for the wrong reasons. Board members are seeking personal gain or the next office; the staff is seeking to grow the organization or to take advantage of other agencies, etc. Engineers fall in love with their conceptual projects. Decisions can be made on short-term criteria as opposed to long-term considerations.

Too often, incidental analysis is not fully considered.

Importance:

Strong, ethical leadership is the cornerstone for sound, well-run water utilities. It is highly important!

How Can This Category of Information Be Better Conveyed to Policy Makers?

NWRI can help to research and identify different leadership models and decision-making criteria. Other foundations (e.g., CORO Foundation) exist to help. Dr. John Carver is another resource in leadership models.

Title: **Risk, Not Just a Game But a Way of Life**

Originator: **Albiani**

Category of Information Description:

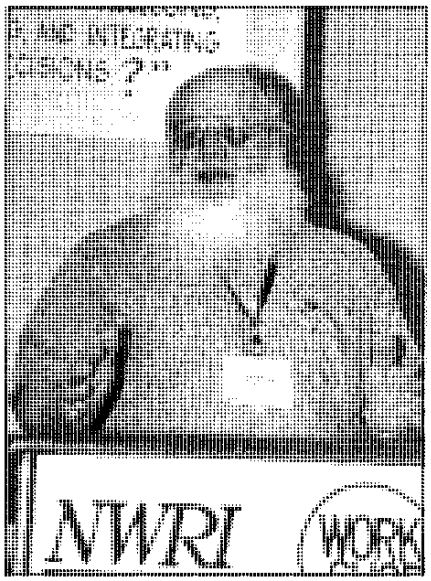
Often, policy makers will not take risks necessary to make difficult decisions.

Importance:

Without the willingness by policy makers to take these risks, public policy and decision making greatly suffers. Over time, the quality of life of residents will be reduced.

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Add risk as an agenda item at an introduction workshop for policy leaders
- List case studies of successful risk takers, their failures, and how they overcame these challenges.



PRIORITY 16

Understand the Safety of Properly Treated Reused Water

ORIGINATORS:

Gaither on behalf of himself, Brown, Jones, and McDaniel

The following categories of information were consolidated under the above title:

Title: **Understand the Safety of Properly Treated Reused Water**

Originator: **Gaither**

Category of Information Description:

The most fundamental issue confronting society is the need to understand the ability of technology to clean and purify virtually any source water to create high quality drinking water.

Importance:

Simple slogans like "Toilet to Tap" are naively (or maliciously) created to mis-inform the public and kill important water reuse projects.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Originators of water reuse projects must understand the importance of courting the media. The most successful techno-politicians must meet with editorial boards of newspapers, TV, magazines, etc, early in the project so that a friendly, informed, and supportive media will be ready to influence the public in their reporting and opinion columns. The media must "believe" in the "rightness" of the cause so their key folks will support the project in all internal discussions, editing, cartoons, etc.

Title: **Home Collection System to Home Delivery System**

Originator: **Brown**

Category of Information Description:

More and more, we look at water reuse as one of many answers to future water needs. We need to sell reuse to the policy makers and consumers. We must overcome catch phrases such as "Toilet to Tap."

The space shuttle does not tow a water truck into space.

Importance:

If we do not gain acceptance to water reuse, we will lose the ability to use it.

How Can This Category of Information Be Better Conveyed to Policy Makers?

We have developed a recycling education plan that works. Many people and businesses brag that they use recycled products. We should adapt that education plan to water.

Title: **Joining of Wastewater and Potable Water Users in a Like Mind—Water is Water**

Originator: **Jones**

Category of Information Description:

Too often, the California Association of Sanitation Agencies (CASA) members are suspicious of water purveyors.

Importance:

- A product that used to be thrown away – "wastewater" – has now become a source for water and recycled water.
- Districts that provide water must work with and join agencies that treat wastewater.
- Mutual benefits for all customers.

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Bring both providers (utilities) together such, as the WateReuse Association or NWRI.
- Look to development and developer money to fund recycling and new source water identification.

Title: **Coming Out of the Water Closet – Plain Talk About Water Reuse for "Joe Six Pack"**

Originator: **McDaniel**

Category of Information Description:

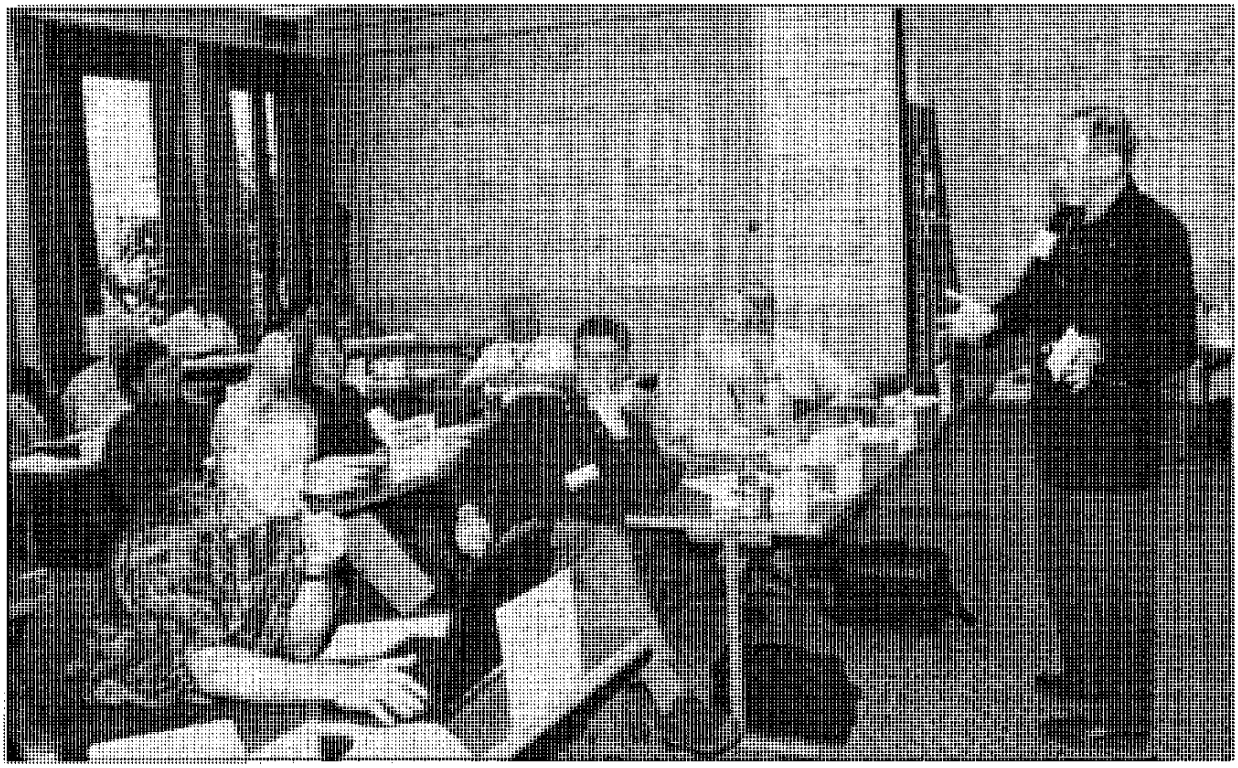
Clear information about water reuse is essential to sell the project and avoid charges of "cover-up" later on. Several water-recycling projects are described as "groundwater replenishment" using "highly heated wastewater" or "tertiary effluent." These attempts to "pretty-up" what the public sees as "sewer water" hurt credibility. Agencies can use plain talk without fear of reprisal.

Importance:

If agencies hide behind euphemisms and acronyms, the public feels they are trying to hide the truth, and trust is lost.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Present successful case examples of plain-talk success stories.



PRIORITY 17

Impact of Decisions on Non-constituents

ORIGINATORS:

Albiani on behalf of himself and Dickinson

The following categories of information were consolidated under the above title:

Title: **Impact of Decisions on Non-constituents**

Originator: **Albiani**

Category of Information Description:

Water is a commodity that is often delivered regionally or on a watershed basis. Nevertheless, the laws that govern water distribution and water quality are often made by state or federal entities comprising representatives from a specific area.

The dynamics of a regional commodity versus state/federal control do not allow decision makers to adequately understand another region's needs, challenges, views, and impacts. Better understanding of others' needs, views, and requirements would assist in making better policy decisions.

Importance:

Decisions based only on regional needs and understandings are being made while overarching policy decisions are being punted.

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Educate policy makers of the varying dynamics and physical attributes of water.
- Distribute existing water education materials to policy-making bodies, editorial boards, and senior staff.
- Consolidate existing information into digestible pieces and distribute this information through existing organizations and channels.

Title: **Multiple Benefits of Water Efficiency Programs**

Originator: **Dickinson**

Category of Information Description:

Water efficiency (or water conservation) is generally thought of as simply a drought mitigation measure by some, a supply augmentation measure by others, but not usually as a means of achieving other environmental objectives more traditionally associated with watershed management programs. Such environmental objectives include the improvement of non-point source water quality, reduction of green waste, and improvement of instream flows at critical times of the year.

Importance:

Although the relationships might be intuitively clear about how these environmental objectives are achieved, the relationships have never been quantified in any way or researched such that these multiple benefits would have value in a cost-benefit analysis of a water conservation program. Because of this lack of quantification, policy makers often do not see the clear benefits separate from supply augmentation and often do not value the water conservation program highly enough. Where this issue is now an immediate relevant concern in California is that CALFED will be awarding incentive grant funding for water efficiency projects based on these multiple benefits without any clear indication of how to rank the multiple benefits of those projects.

How Can This Category of Information Be Better Conveyed to Policy Makers?

There are several ways this could be addressed. Research could produce mathematical ways to express each situation, or generalized proxy values could be developed for the various environmental factors that could be invoked where relevant. These benefits have societal value that need to be somehow conveyed to policy makers.

Title: **The Public Interest in Sustainable Water Resources Management**

Originator: **Dickinson**

Category of Information Description:

Conflicts over water supplies or in-stream flow for the environment have blurred the state's role in securing the public's interest in maintaining sustainable water resources for future generations. The Public Trust doctrine has helped but seems to always have to be judicially interpreted. We need a way to plan without continually having to resort to the courts on a case-by-case basis. As water supplies become more privatized, and as transfers and an open market become more prevalent, this phenomenon will only worsen.

Importance:

The lack of any specific state policy has resulted in permit wars, transfer wars, and a mode of decision-making where the environment has to actually financially pay for in-stream flows. Where the conflict arises is in the application of appropriative water rights to the exclusion of the overarching public interest issues.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Policy makers are well aware of this conflict but are loath to tackle the problem. Revisiting the water rights issues in California is a hopeless and even suicidal task. However, information on how to better quantify the public interest should be compiled for use in regulatory proceedings and in local supply disputes. In addition, implementing a statewide groundwater management program should greatly improve the public's interest in sustainable water resources management.

PRIORITY 18

Need for Easily Accessible Peer Review of Expert Disputes for Policy Makers

ORIGINATOR

Atwater

Category of Information Description:

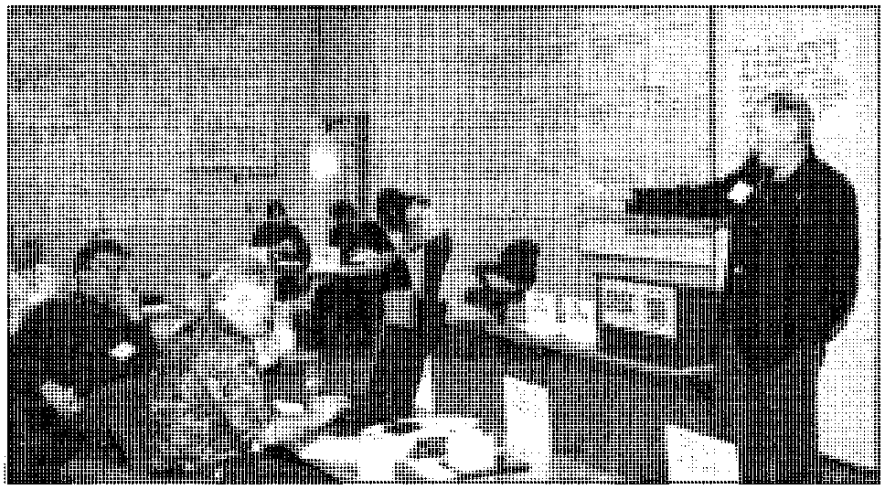
Expert disputes are commonplace. Conflicts and confusion between experts make it difficult for policy makers to make decisions.

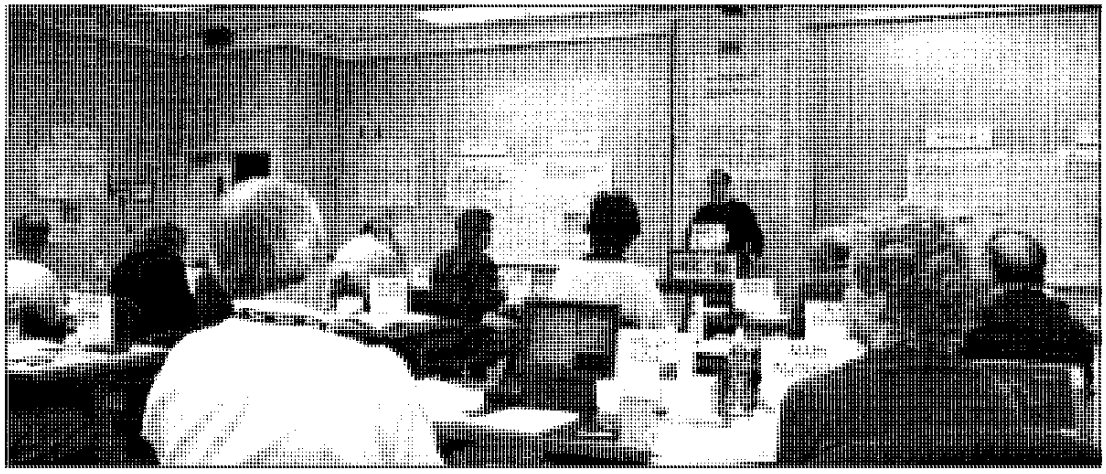
Importance:

A dependent "objective" peer review will greatly increase the trust of the public and policy makers of expert opinions.

How Can This Category of Information Be Better Conveyed to Policy Makers?

NWRI and other organizations should provide NGT workshops and other peer review panels of experts to quickly.





PRIORITY 19

Watershed Management – Who Is in Charge?

ORIGINATOR

Rowe

Category of Information Description:

As watersheds become stressed, governance by many local, related and unrelated agencies is problematic. The Santa Ana Watershed Project Authority (SAWPA) is an example of a watershed management Joint Power Authority (JPA) agreement that works to address issues of mutual benefit. Examples of success include the construction of desalting plants and a regional brine line system and funding from state and federal sources.

Examples of areas needing watershed governance:

- Santa Clara River (Los Angeles and Ventura)
- Los Angeles and San Gabriel Rivers
- Alameda Creek Watershed

Importance:

- Work in opposition rather than in support of others in the watershed.
- Improve progress in completing/prioritizing projects.

How Can This Category of Information Be Better Conveyed to Policy Makers?

- Education on successes and failures of watershed management schemes.
- Progress toward JPA agreements that include elected officials authorizing expending funds for public projects to improve water supply and water quality.
- Convey benefits of cooperation outweighing detriments

PRIORITY 20

Where Do We Get the Resources to Gather and Interpret Data and Educate Ourselves?

ORIGINATOR

Macler

Category of Information Description:

Most ideas to improve information quality and quantity, educate decision makers, and include the interested publics require for substantial resources of time, bodies, and money. Information on how to get these resources is badly needed.

Importance:

Without resources, information is not used. Thus, decisions lack the benefits of this information.

How Can This Category of Information Be Better Conveyed to Policy Makers?

Must be generated and distributed (data/information must have adequate value to command resources).

STRENGTH OF FEELING ANALYSIS

The following five Strength-of-Feeling tables give a quantitative sense of the degree of agreement or disagreement among participants about the importance of the different categories of information they identified at the conclusion of the NGT Workshop. Table 1 shows how all-18 participants ranked the 20 major information category areas they created. Tables 2-5 show the priority ranking and the relative level of agreement among the four sub-groups of participants. The sub-groups of participants whose Strength of Feeling was analyzed were (1) Appointed or Elected Officials, (2) Consultants, (3) Regulators, and (4) Utility Representatives.

Each table lists, in descending order of importance, the major category areas of information they regarded as significant in the context of the question asked of the NGT Workshop participants. Beside each category title is the number of times it was picked, the total number of points it received from all participants who selected the category, and finally, the strength of feeling expressed as a percentage. The times picked are a straightforward count of the number of ranking sheets on which that category appeared. The points column shows the total number of points that a particular category received. For example, if all 18 participants ranked a category last on their voting sheet, it would show a total of 18 points (one point per participant because each ranked it tenth). On the other hand, if each of the 18 participants ranked a category first it would have 180 points (ten points assigned by each participant).

The Strength of Feeling expressed as a percentage is the number of points a category received divided by the maximum number of points it could have received if every participant had ranked it first. As an example, the highest-ranking category was voted for by 17 of the 18 participants. If all had ranked it first it would have received 180 points. However, it received a total of only 110 points so its strength of feeling was 110/180 x 100 = 61.1 percent.

Examination of sub-group rankings is important because stark disagreements among groups are masked in the overall ranking (Table 1) but are revealed in the sub-group Tables 2-5. For example, the highest priority category of information selected by all participants was the same as the highest priority category selected by the six utility participants (Table 5) and the four appointed or elected participants (Table 2). This same category was ranked third by the consultants (Table 3) but only seventh by the regulator participants (Table 4). This kind of dramatic difference in opinion will deserve evaluation before an action plan is implemented

TABLE 1

Categories of Information (20) Ranked by all Participants (18)

Rank	Title	Times Picked/Pts	Strength of Feeling
1.	Understand Constituents' Needs and Wants and Learn to Operate Within Them While Effectively Altering Them When Necessary	17/110	61.1%
2.	Public Desire to Determine and Assure the Safety of Their Drinking Water	17/107	59.4%
3.	The Importance of Doing Something Correctly With Appropriate Processes the First Time	13/84	46.7%
4.	The Usefulness of Any Information Category Is Directly Proportional to the Quality of the Information It Contains	13/81	45.0%
5.	Information About What Others Are Doing	12/73	40.6%
6.	The Valuation of Water as an Asset	12/67	37.2%
7.	Appropriate Technology to Invest in Today to Meet Tomorrow's Regulations	10/59	32.8%
8.	Equip Policy Makers With Legislative, Regulatory, and Financial Knowledge	12/59	32.8%
9.	Integrate Plans for Land Uses and Water Resources	10/57	31.7%
10.	Global Concerns for Water Need to Be Identified and Communicated	7/43	23.9%
11.	Forecast Project or Policy Effects in Light of Prospective Change and Uncertainty	11/40	22.2%
12.	Fund and Coordinate Interagency Baseline Data to Enhance Web-based Water Resource Management	6/34	18.9%
13.	Unfunded Mandates by Policy Makers Need to Stop!	5/34	18.9%

Rank	Title	Times Picked/Pts	Strength of Feeling
14.	Identify, Mitigate, and Communicate Risks Associated With Successful Public/Private Partnership Projects	8/32	17.8%
15.	Ethical Leadership Principles	6/27	15.0%
16.	Understand the Safety of Properly Treated Reused Water	7/25	13.9%
17.	The Public Interest in Sustainable Water Resources Management	4/24	13.3%
18.	Need for Easily Accessible Peer Review of Expert Disputes for Policy Makers	4/13	7.2%
19.	Watershed Management – Who Is in Charge?	3/12	6.7%
20.	Where Do We Get the Resources to Gather and Interpret Data and Educate Ourselves?	3/9	5.0%

TABLE 2

Categories of Information (20) Ranked by Appointed or Elected Participants (4)

Rank	Title	Times Picked/Pts	Strength of Feeling
1.	Understand Constituents' Needs and Wants and Learn to Operate Within Them While Effectively Altering Them When Necessary	4/31	77.5%
2.	Integrate Plans For Land Uses and Water Resources	3/25	62.5 5
3.	Public Desires for Determining and Assuring the Safety Of Their Drinking Water	4/21	52.5%
4.	The Valuation of Water As an Asset	4/19	47.5%
5.	The Importance of Doing Something Correctly With Appropriate Processes the First Time	3/18	45.0%
6.	Equip Policymakers With Legislative, Regulatory, and Financial Knowledge	3/17	42.5%
7.	The Usefulness of Any Information Category Is Directly Proportional To the Quality Of the Information It Contains	2/10	25.0%
8.	Information About What Others Are Doing	2/10	25.0%
9.	Global Concerns For Water Need To Be Identified and Communicated	1/10	25.0%
10.	Appropriate Technology To Invest in Today to Meet Tomorrow's Regulations	1/9	22.5%
11.	Understand the Safety of Properly Treated Reused Water	3/9	22.5%
12.	Fund and Coordinate Interagency Baseline Data To Enhance Web-based Water Resource Management	2/9	22.5%
13.	Watershed Management --- Who Is In Charge?	2/9	22.5%

Rank	Title	Times Picked/Pts	Strength of Feeling
14.	Forecast Project Or Policy Effects in Light Of Prospective Change and Uncertainty	2/8	20.0%
15.	Identify, Mitigate, and Communicate Risks Associated With Successful Public/Private Partnership Projects	1/5	12.5%
16.	Ethical Leadership Principles	1/5	12.5%
17.	Where Do We Get the Resources To Gather and Interpret Data and Educate Ourselves?	1/3	7.5%
18.	The Public Interest In Sustainable Water-Resources Management	1/2	5.0%

TABLE 3

Categories of Information (20) Ranked by Consultant Participants (6)

Rank	Title	Times Picked/Pts	Strength of Feeling
1.	The Importance of Doing Something Correctly With Appropriate Processes the First Time	5/38	63.3%
2.	Public Desire to Determine and Assure the Safety of Their Drinking Water	6/37	61.7%
3.	Understand Constituents' Needs and Wants and Learn to Operate Within Them While Effectively Altering Them When Necessary	5/36	60.0%
4.	The Valuation of Water as an Asset	4/27	45.0%
5.	The Usefulness of Any Information Category Is Directly Proportional to the Quality of the Information It Contains	5/26	43.3%
6.	Equip Policy Makers With Legislative, Regulatory, and Financial Knowledge	5/24	40.0%
7.	Information About What Others Are Doing	3/23	38.3%
8.	Integrate Plans for Land Uses and Water Resources	4/22	36.7%
9.	Appropriate Technology to Invest in Today to Meet Tomorrow's Regulations	4/17	28.3%
10.	Understand the Safety of Properly Treated Reused Water	3/12	20.0%
11.	The Public Interest in Sustainable Water Resources Management	2/12	20.0%
12.	Ethical Leadership Principles	2/10	16.7%
13.	Fund and Coordinate Interagency Baseline Data to Enhance Web-based Water Resource Management	2/10	16.7%

Rank	Title	Times Picked/Pts	Strength of Feeling
14.	Forecast Project or Policy Effects in Light of Prospective Change and Uncertainty	2/9	15.0%
15.	Identify, Mitigate, and Communicate Risks Associated With Successful Public/Private Partnership Projects	3/8	13.3%
16.	Unfunded Mandates by Policy Makers Need to Stop	1/7	11.7%
17.	Need for Easily Accessible Peer Review of Expert Disputes for Policy Makers	2/5	8.3%
18.	Global Concerns for Water Need to Be Identified and Communicated	1/4	6.7%
19.	Watershed Management – Who Is in Charge?	1/3	5.0%

TABLE 4

Categories of Information (20) Ranked by Regulator Participants (2)

Rank	Title	Times Picked/Pts	Strength of Feeling
1.	Public Desire to Determine and Assure the Safety of Their Drinking Water	2/19	95.0%
2.	The Usefulness of Any Information Category Is Directly Proportional to the Quality of the Information It Contains	2/18	90.0%
3.	Appropriate Technology to Invest in Today to Meet Tomorrow's Regulations	2/15	75.0%
4.	The Valuation of Water as an Asset	1/9	45.0%
5.	Ethical Leadership Principles	2/9	45.0%
6.	Information About What Others Are Doing	2/8	40.0%
7.	Understand Constituents' Needs and Wants and Learn to Operate Within Them While Effectively Altering Them When Necessary	2/7	35.0%
8.	Identify, Mitigate, and Communicate Risks Associated With Successful Public/Private Partnership Projects	1/6	30.0%
9.	Forecast Project or Policy Effects in Light of Prospective Change and Uncertainty	2/6	30.0%
10.	Where Do We Get the Resources to Gather and Interpret Data and Educate Ourselves?	1/5	25.0%
11.	The Importance of Doing Something Correctly With Appropriate Processes the First Time	1/3	15.0%
12.	Equip Policy Makers With Legislative, Regulatory, and Financial Knowledge	1/3	15.0%
13.	Need for Easily Accessible Peer Review of Expert Disputes for Policy Makers	1/2	10.0%

TABLE 5

Categories of Information (20) Ranked by Utility Participants (6)

Rank	Title	Times Picked/Pts	Strength of Feeling
1.	Understand Constituents' Needs and Wants and Learn to Operate Within Them While Effectively Altering Them When Necessary	6/36	60.0%
2.	Information About What Others Are Doing	5/32	53.3%
3.	Public Desire to Determine and Assure the Safety of Their Drinking Water	5/30	50.0%
4.	Global Concerns for Water Need to Be Identified and Communicated	5/29	48.3%
5.	The Usefulness of Any Information Category Is Directly Proportional to the Quality of the Information It Contains	4/27	45.0%
6.	Unfunded Mandates by Policy Makers Need to Stop!	4/27	45.0%
7.	The Importance of Doing Something Correctly With Appropriate Processes the First Time	4/25	41.7 %
8.	Appropriate Technology to Invest in Today to Meet Tomorrow's Regulations	3/18	30.0%
9.	Forecast Project or Policy Effects in Light of Prospective Change and Uncertainty	5/17	28.3%
10.	Equip Policy Makers With Legislative, Regulatory, and Financial Knowledge	3/15	25.0 %
11.	Fund and Coordinate Interagency Baseline Data to Enhance Web-based Water Resource Management	2/15	25.0%
12.	Identify, Mitigate, and Communicate Risks Associated With Successful Public/Private Partnership Projects	3/13	21.7%

Rank	Title	Times Picked/Pts	Strength of Feeling
13.	The Valuation of Water as an Asset	3/12	20.0%
14.	Integrate Plans for Land Uses and Water Resources	3/10	16.7%
15.	The Public Interest in Sustainable Water Resources Management	1/10	16.7%
16.	Need for Easily Accessible Peer Review of Expert Disputes for Policy Makers	1/6	10.0%
17.	Understand the Safety of Properly Treated Reused Water	1/4	6.7%
18.	Ethical Leadership Principles	1/3	5.0%
19.	Where Do We Get the Resources to Gather and Interpret Data and Educate Ourselves?	1/1	1.7%

APPENDICES

APPENDIX A

ACRONYMS

ACWA	Association of California Water Agencies
AMWA	Association of Metropolitan Water Agencies
AWWA	American Water Works Association
AWWARF	American Water Works Research Foundation
BAT	Best Available Technology
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
CASA	California Association of Sanitation Agencies
CEQA	California Environmental Quality Act
CSDA	California Special Districts Association
CT	Concentration x Contact Time Protection Agency
CWM	Comprehensive Watershed Management (GIS-Based System)
DBP	Disinfection By-product
EBMUD	East Bay Municipal Utility District
GIS	Geographic Information Systems
HTML	Hypertext Markup Language
ICMA	International City/County Management Association
ILSI	International Life Science's Institute
JPA	Joint Powers Authority

M.F.	Microfiltratiion
MTBE	Methyl Tertiary Butyl Ether
NAS	National Academy of Sciences
NEPA	National Environmental Protection Act
NGT	Nominal Group Technique
NRC	National Research Council
NWRI	National Water Research Institute
SAR	Santa Ana River
SAWPA	Santa Ana Watershed Project Authority
SWFWMD	Southwest Florida Water Management District
USEPA	United States Environmental
WERF	Water Environment Research Foundation
WRF	Water Reuse Foundation

APPENDIX B

PREVIOUS NGT WORKSHOPS CONDUCTED BY NWRI

Oxygenate Contamination. Report of a workshop sponsored by NWRI in cooperation with the United States Bureau of Reclamation. Kellogg West Conference Center/Hotel, California State Polytechnic University, Pomona, CA, September 15-17, 2000: 258p

Utility Leadership. Report of a workshop sponsored by NWRI in cooperation with Malcolm Pirnie, Inc., the University of Southern California, and the University of South Florida. Kellogg West Conference Center/Hotel, California State Polytechnic University, Pomona, CA, October 24-26, 1999: 154p

Non-potable Water Recycling. Report of a workshop sponsored by NWRI in cooperation with Irvine Ranch Water District and the Orange County Water District. Kellogg West Conference Center/Hotel, California State Polytechnic University, Pomona, CA, May 23-25, 1999: 174p.

Conjunctive Use Water Management Program. Report of a workshop jointly sponsored by NWRI, Association of Ground Water Agencies, and the Metropolitan Water District of Southern California. Kellogg West Conference Center/Hotel, California State Polytechnic University, Pomona, CA, May 27-29, 1998: 157p.

Barriers to Providing Safe Drinking Water Through Small Systems. Report of a workshop jointly sponsored by NWRI, Pan American Health Organization, and NSF International/WHO Collaborative Center. Pan American Health Organization Headquarters, Washington, D.C., May 13-15, 1998: English report: 175p., Spanish report: 188p. (Bound in a single volume.)

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APPENDIX C

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APPENDIX D

Overview of Project Risk Mitigation Tampa Bay Water Seawater Plant

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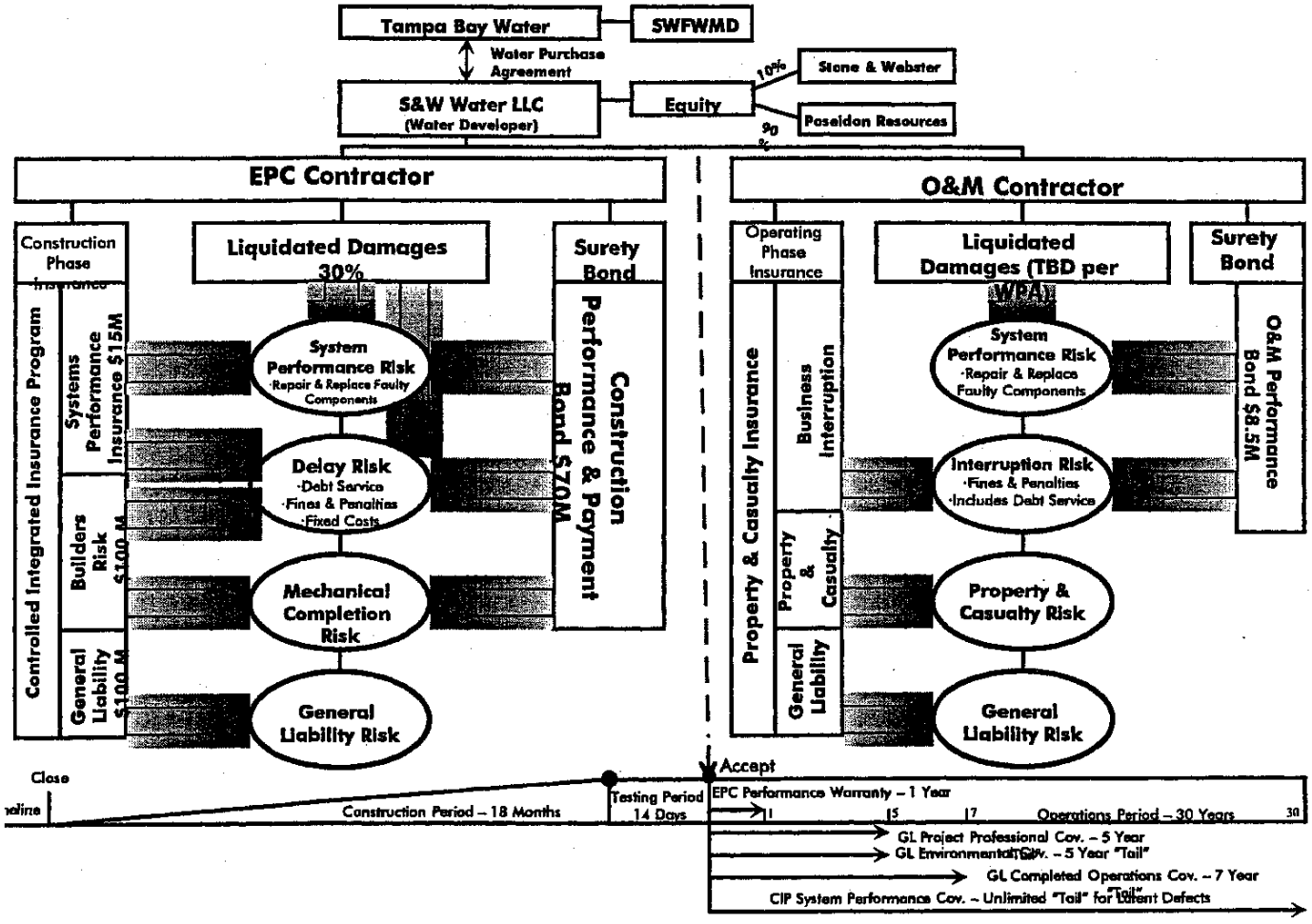
Southwest Florida Water
Management District

Overview of Project Risk Mitigation



Desalination in the U.S.

Tampa Bay Water Seawater Plant

The Community and Partners

Tampa Bay Water is Florida's largest wholesaler providing water to its member governments of Hillsborough, Pasco, and Pinellas Counties, and the Cities of New Port Richey, St. Petersburg, and Tampa. Those member utilities in turn serve 2 million people in the Tampa Bay area. Tampa Bay Water, in partnership with Poseidon Resources, Tampa Electric, and the Southwest Florida Water Management District (SWFWMD), is presently developing the nation's largest seawater desalination plant, initially producing 25 million gallons per day (Mgd) of drinking water. This project will be required by agreement to be online by December 31, 2002.

Why Seawater Desalination?

The tri-county area, like many coastal cities, has experienced significant growth in recent years. Overpumping at the wellfields has created environmental stresses, and Tampa Bay Water has been mandated by SWFWMD to reduce groundwater pumping from a current level of 158 Mgd to 121 Mgd by 2003. Additionally, by the year 2008, the pumping must be further reduced to 90 Mgd. To address this significant reduction in groundwater pumping, a Master Water Plan was developed for the community which will utilize seawater desalination to provide 10% of the total water supply by the year 2007.

Though desalination, especially seawater desalination, has historically been too expensive for most U.S. communities, the economics are changing. The desalination technologies used today are cost-effective and dependable, with improved energy efficiencies, manufacturing and material improvements contributing to the improved economics. At the Tampa Bay plant, additional cost savings were realized through a public/private partnership and colocation with an electric utility. Tampa Bay Water has chosen desalination as a drought-proof, cost-effective means by which to diversify their water supply.

Benefits to the Community

The most significant benefits of this project will be:

(1) the protection of the environment by reduction in wellfield pumping from the groundwater aquifers, and

(2) continued economic growth and prosperity of the community due to the ongoing availability of high quality water for human consumption, tourism, and industry.

Additionally, the project will generate about $162 million in direct economic benefits to Hillsborough County in wages and personal income, with total project revenue of about $600 million to the community.

"A desalination plant on Tampa Bay will be one of the environmentally safest fresh water supplies in the system." - David Fischer, Mayor, St. Petersburg and Chairman of Tampa Bay Water

Overview of the Project

The Tampa Bay Water Plant will initially produce 25 Mgd of drinking water, expandable to 35 Mgd. To produce 25 Mgd of drinking water, 44 Mgd of seawater will be taken from the adjacent Big Bend Power Plant. The 19 Mgd concentrate stream left over from the desalting process is little more than twice as concentrated as the original seawater, and will be mixed with 1,400 Mgd of seawater used daily at the Big Bend Power Plant for cooling purposes. Mixing will occur prior to discharge back into the Bay.

"The water industry can now look at large-scale desalination as part of the solution to water supply problems across our nation and abroad." - Walter Winrow, Poseidon Resources

Published by the Bureau of Reclamation
in cooperation with Tampa Bay Water

Prior to selecting a developer for the project, Tampa Bay Water and its member governments, along with SWFWMD, were very sensitive to the needs of the aquatic life and marine environment in Tampa Bay and conducted several studies on the Bay. In addition, one of the reasons the developer selected the Big Bend Power Plant site is because of the volume of data available to predict any changes which might occur once the plant is operational. In addition, this site provides the ability to mix the discharge from the power plant with the desalination plant concentrate flow prior to returning it to the Bay. Though all predictions indicate there will be no effect on the Tampa Bay marine environment, a life-time monitoring program will ensure that if there are any impacts, they will be identified and operations changed accordingly.

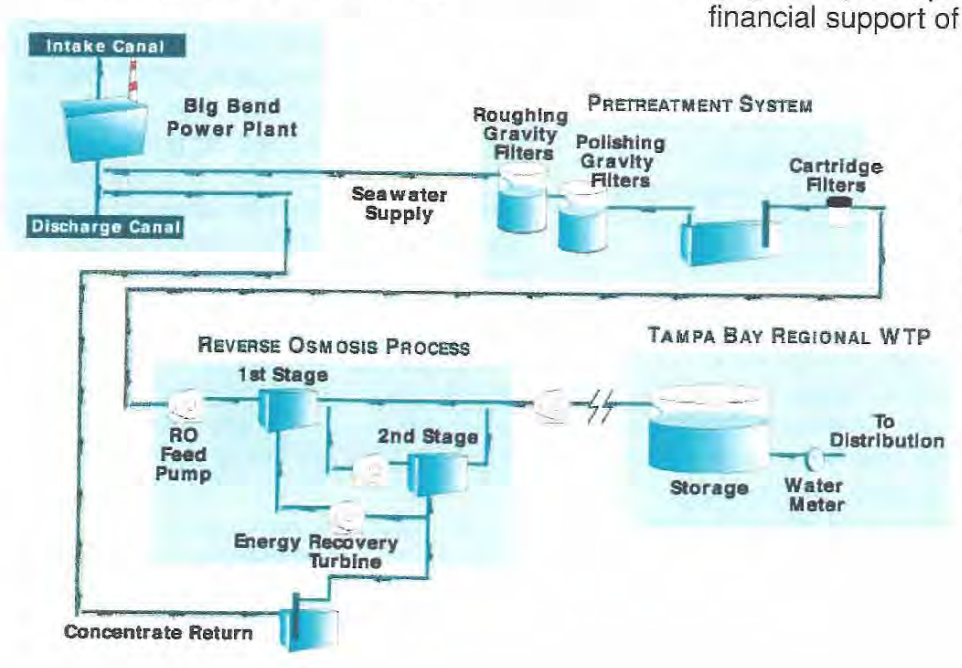
The Tampa Bay Water Plant will utilize reverse osmosis (RO) technology to desalinate the seawater, using a two stage process, and will pretreat the seawater to remove any particulate matter and microscopic materials prior to the RO (see diagram at the bottom of this page). The RO process is a pressure-driven process (using pumps) in which a portion of the incoming water is forced through a semi-permeable membrane leaving the salts behind to exit with the remaining water. Desalinated water is the highest quality and purest water available in the world today.

Comparative Cost

The desalination plant will cost approximately $100 million to construct. The plant is a public/private partnership with the private partner, S&W Water, LLC. S&W Water, comprised of 90% Poseidon Resources, will incur much of the financial risk for the project. Additionally, the SWFWMD is co-funding the project to offset the cost to Tampa Bay Water. As a result, Tampa Bay Water will pay only a 30-year net average of $2.08/1000 gal of desalinated water, less the $0.40-0.60/1000 gal utilizing the SWFWMD funds towards the capital cost of the plant. Final cost to Tampa Bay Water is about $1.60/1000 gal.

The cost of seawater desalination for the Tampa Bay Water project is low when compared to historical seawater desalination cost in other parts of the world. This cost can be attributed to the lower salinity of the Gulf seawater compared to seawater in many other areas; shared intake/outfall with the Big Bend Power Plant; reasonable power cost of $0.04/kwh; and improved economics through a long-term public/private partnership and financial support of SWFWMD.

Schematic of basic technologies to be used at the Tampa Bay Water Desalination Plant



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