Ocean Desalination

Some Conclusions & Recommendations from a Conference Co-Sponsored by the Desal Response Group & the Aquarium of the Pacific

ON OCTOBER 5, 2006, the Desal Response Group and the Aquarium of the Pacific co-sponsored a one-day conference on ocean desalination that brought together more than 70 experts and activists on issues related to ocean desalination. The stated goal of the conference was to provide a fresh, balanced perspective of the potential role ocean desalination might play in Southern California's water portfolio in 2030. While some sessions might not have provided a fully balanced discussion of issues related to ocean desalination in the context of all other sources of fresh water, many important points of agreement and contention did emerge. This brief document is a summary of those points. We have divided them into three categories: major conclusions, points of uncertainty, next steps. We believe there was a consensus—not unanimity—on the statements below.

Major Conclusions

CALIFORNIA IS LEADING THE NATION in addressing environmental issues that will affect the lives of future generations. We now have the opportunity to "get it right" when it comes to deciding how the future water needs of the state will be met. To do so requires that a careful, thoughtful analysis be done; one that should be started now before we are faced with a crisis, and one that considers all alternatives, including desalination of ocean water, and that uses a uniform and sophisticated approach to assessing costs and benefits in all categories.

- Planning for California's 2030 water portfolio should have as a goal: provision of a water supply that is stable, adequate, affordable, of high quality, with enough redundancy and elasticity to reduce risk to acceptable levels, and one that is environmentally "green." It should not ignore the value of the coast and ocean to the state's economy from the standpoints of aesthetics, education, and recreation. Consideration needs to be given to: day-to-day issues and long-term issues, not just disasters; capturing the benefits of the thermal energy and waste water that are now being discarded; include production of green house gases, changes in sea level, and changes in storm frequency and intensity because of global climate change in selecting plant locations; and economic value of California's coast and ocean beyond that of extraction of natural resources.
- Ocean desalination will play a role in California's future water portfolio, but that future is not yet here.
- A major event such as an earthquake that interrupts the flow of water from Northern California to Southern California could dramatically and almost instantaneously change Southern California's priority for ocean desalination.
- In the year 2030, depending on climatic conditions, population levels, energy methods and costs, housing and construction patterns, effectiveness of ever-improving energy and water conservation efforts, water needs in California will be best met through a diverse portfolio of sources that blend water quality and delivery methods that will almost certainly include desalinated ocean water.

The assumption should not be made that just because the population of southern California is increasing, water use must also increase. Now is the time to explore water conservation in depth beyond just what the general public can be educated to conserve. We should:

- Explore reduction of urban and industrial water usage through low flow plumbing, use of drought resistant native plants in landscaping; smaller lawns, capture, storage and treatment of urban runoff, the introduction of evapotransmission

controllers (i.e. recycling of water), etc.

- Explore reduction of water usage for agriculture through better irrigation practices, more appropriate crop selection, etc.
- Encourage city building code changes that require water conservation technologies in both new and remodeling projects (pervious paving, native landscaping, water saving plumbing, etc.).
- Encourage pricing strategies that reflect true costs of water.

Proposals for 23 desalination plant were in process in spring 2006, with 12 of these proposed for Southern California. They represent a wide variety of sizes, designs, and institutional models.

- We need institutional mechanisms to integrate across single purpose agencies, across environmental compartments, etc. These mechanisms either are non-existent, or ineffectual.
- If desalination is to work for California, interagency cooperation is essential. The regulatory and permitting processes governing desalination operations are fragmented, unclear, and involve too many agencies that do not work effectively together.
- Decision-making processes should be open, transparent, and involve all the stakeholders including the public. The public is not now included in discussions of proposals for privately owned operations. Efforts should be made to determine if private is better than public; if small is better than large: if local is better than regional.
- It is important that mechanisms be developed for sharing of information about ocean desalination alternatives; coastal zone management including coastal development and land use; decisions on siting coastal or inland plants; co-location; etc.
- Siting of all coastal facilities, including ocean desalination plants, must be done in the context of global climate change, particularly the rise of sea level.

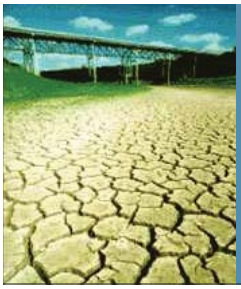
California's Ocean Economy report (July 2005) stated that California has the largest ocean economy in the United States. In 2000 the direct value of coastal tourism and recreation and the multipliers of employment, wages, and GSP was $22,367,879,303. California's unique ocean and coastal resources are important to sustaining that economy. The report also stated that this information "… underscores the need for continued leadership in balancing resource protection and economic development."

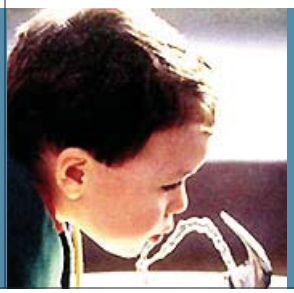
- The ocean, and particularly the coastal ocean, is in trouble and a regional, watershed approach is needed as advocated by both the Pew Oceans Commission and the U.S. Commission on Ocean Policy.
- Evaluation of costs and benefits of desalination and other water delivery systems must be balanced by negative impacts on coastal tourism and recreation.

Among the guiding principles included in California's Ocean Protection Act (COPA) that all state agencies must follow are (1) "Making aesthetic, educational, and recreational uses of the coast and ocean a priority and (2) Recognizing the 'precautionary principle' where the possibility of serious harm exists, lack of scientific certainty should not preclude action to prevent the harm."

- Water is a public trust. The ocean is a commons.
- Coastal zone management is critical in the siting of ocean desalination plants, water treatment facilities, power plants, etc.
- The input of freshwater to the coastal zone is important to ecosystem integrity. The amounts, timing, and variability of the inputs all are important ecosystem drivers.

"Work to eliminate the harmful environmental impacts of once-through cooling at coastal power plants" is an objective in Section C: Ocean and Coastal Water Quality of the






California Ocean Protection Council's *A Vision for Our Coast and Ocean Five Year Strategic Plan 2006*. The objective is titled "Once through Cooling." The document includes a number of action plans among them urging the State Water Resources Control Board to implement protective measures to achieve a 90-95% reduction in impacts of entrainment and impingement and to establish an interagency coordinating committee to coordinate the activities of regulatory authorities that address once-through cooling.

- Entrainment and entrapment impacts of ocean desalination plants are coupled tightly to the design and placement of the intake and discharge structures. Use of coastal wells or buried intakes can greatly reduce entrainment and entrapment losses.
- Entrainment and entrapment losses are associated not only with ocean desalination intakes, but also with pumps and canals used in diversion practices.
- Technology will continue to evolve. This includes desalination technology. We should not get locked into today's technology in a way that inhibits being able to take advantage of technological breakthroughs.
- The advantages and disadvantages of co-location of ocean desalination plants with power plants with once-through cooling systems and with publicly owned treatment works (wastewater treatment plants) need to be rigorously evaluated.

Water produced from ocean water desalination is, and will remain for the foreseeable future, the most expensive of the potential sources of fresh water for southern California and other parts of the state.

- All existing and potential sources of fresh water for future needs should be evaluated in terms of their relative costs, environmental impacts, use of energy, etc. in the context of the full range of alternatives.
- Present diversion practices to provide Southern California with water to meet its needs have resulted in significant environmental impacts in San Francisco Bay and in the Sea of Cortez. The environmental costs of continuing such diversion need to be an important factor in the study of costs.

Points of Uncertainty

Public education

- How can we best inform the public about the real costs of fresh water—financial and environmental—from all sources, existing and potential, including ocean desalination?
- Can we change the public's perception of the "yuck factor" associated with "toilet to tap" so that treated waste water could be an important source of potable water in 2030?

Institutional

- Are existing institutional and regulatory mechanisms adequate to ensure that water created through ocean desalination would reduce the amounts of water diverted away from the Sacramento-San Joaquin Delta and the Colorado Delta?

Entrainment and Entrapment

- Will we rigorously evaluate the biological impacts associated with entrainment and entrapment by ocean desal facilities as a function of design and placement of the intake and discharge structures using the best models and data available?
- Will we put these entrainment and entrapment losses in context of entrainment and entrapment losses associated with diversion?

Siting issues

- What are the advantages and disadvantages of co-location of ocean desalination plants with power plants with once-through cooling systems and with publicly owned treatment works (wastewater treatment plants)? These need to be rigorously evaluated.
- How should global climate change affect the siting of ocean desalination plants given the projected rise in sea level, and the potential for increased frequency and intensity of coastal storms.
- Who determines where plants should be placed—the state or local governments? What is the process? How can it be made more effective and more responsive to advances in knowledge and to stakeholder concerns?

Social Issues

- Does privatization of a public good have merit? Under what conditions?
- What role, if any, might mitigation have in ocean desalination? It has been proposed in pending federal legislation. Should mitigation be permitted in place of performance standards? Who should determine where mitigation projects are located? Who determines if mitigation can be used as a tradeoff? What voice should the public have in the decision process?

Important Next Steps

- California may go through a water crisis very soon. We need to diversify the water management portfolio by methodically evaluating the advantages and disadvantages of ocean water desalination before we are faced with a crisis. This must be done in the context of the full suite of alternatives.
- The state should take advantage of the careful, thoughtful approach that the Long Beach Water Department has taken to evaluate the potential role that ocean desalination might play in Long Beach's future.
- California needs to:
  - Develop a comprehensive and integrated state policy for managing our water portfolio, including desalination, replacing the current piecemeal status.
  - Allocate state funds for research on the impacts of desalination entrainment and impingement on biological populations, communities and ecosystems, and investigate the applicability of current research being done on ocean currents, satellite tracking, water quality monitoring, seafloor bed monitoring, etc. in assessing these impacts.
  - Model and compare the true costs of the various alternative methods (including desalination and conservation) to deliver water, including such factors as subsidies, shareholders' profits, energy consumption, and impacts on the environment.
- One powerful way of exploring and clarifying the potential role desalinated ocean water might play in California's future water portfolio is the use of scenario planning. Scenarios are not predictions but internally consistent and plausible pathways to the future. A rigorous scenario analysis would result in the identification of robust strategies that would work across the full range of plausible futures.

San Francisco Bay Delta Estuary, an example of poor water management planning resulting in increased pollutants, freshwater diversion, altered flow regime, and intensified land use.

"California may go through a water crisis very soon. We need to diversify the water management portfolio....."

The Aquarium of the Pacific's Aquatic Forum is dedicated to exploring important, complex, and often contentious issues with environmental, social, and economic dimensions. The Aquatic Forum is an activity of the Marine Conservation Research Institute (MCRI).

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