



Carpe Diem

WESTERN WATER & CLIMATE CHANGE
A PROJECT OF EXLOCO – PATHFINDING IN THE NEW WEST

Re-thinking Storage in the Era of Climate Change

An initiative of the **Carpe Diem - Western Water & Climate Change Project**

Leadership Summit

Friday, November 7, 2008; Offices of the Gates Family Foundation, Denver, CO

Co-hosts: Denver Water, Western Water Assessment, Western Water Policy Project

Sponsor: Brownstein Hyatt Farber Schreck, LLP

Meeting Summary (Final/approved): December 12, 2008

1. Summary

“In 2006, we asked ‘Is climate change real?’ In 2007, we said, ok, we now understand climate change is happening, but we need definitive prediction models to plan. In 2008, we know that, for now, science is going to give us just the benchmarks, and that in 2009 we need to make some tough decisions.”

“What we have is a completely insufficient political leadership and institutional capacity response to the magnitude of the challenge ahead. Is it going to take a series of ‘mega’ disasters to get action, or can we change before those happen?”

“It was a remarkable meeting - I’ve never experienced such diverse group of leaders in one place, everyone rolling up their sleeves and looking at where we might find agreement and where we might find solutions.”

- Comments from Denver meeting participants

Over the past year, Exloco’s **Carpe Diem - Western Water & Climate Change** project has been examining the evolving role of water storage - new, proposed and re-operation of existing projects - in the face of climate change impacts, and exploring the opportunities to find common ground among key stakeholders.

On November 7, in Denver, the Carpe Diem project’s **Re-thinking Storage in the Era of Climate Change** initiative brought together 24 leaders in the field to begin the conversation and work (see participant list in addendum). This meeting was additionally informed by a series of confidential interviews conducted with 18 stakeholders prior to the meeting in Denver.

Three central questions were examined at the Denver meeting:

1. What strategies and opportunities could bring together diverse interest groups to develop joint agreement on storage options? What would be the key criteria for any agreements?
2. Are there actual, or proposed, storage projects that this group could identify as places to build common ground agreements? If so, what would be the next steps? What would be the key components needed for decision-making and stakeholder process?
3. What additional research is needed, and how would those research needs be prioritized? Could a common set of research questions be identified?

At the end of the day, the group collectively agreed that:

- This (Denver) meeting was an important start - and much more work and discussion is needed.
- Storage - new, proposed or re-operation of existing storage - needs to be considered in the context of overall watershed management. That being said, the contentiousness of storage issues gets people to the table to look at new approaches.
- Developed and operated wisely, and in the context of integrated watershed management, storage can be part of a multi-faceted strategy to address climate change variability.
- Upper watersheds/forested regions could be managed differently by public agencies to provide better ecosystem resiliency, better water quality, more reliable and possibly increased supply.
- Human population growth is the critical 'elephant in the room' that needs to be addressed, again in the context of watershed management and supply demand.
- There will have to be trade-offs and compromises - between human needs and ecosystems, upper and lower basins, rural and urban areas and, agriculture use and municipal use. Current institutional decision making processes do not provide the flexibility needed.

The strategies that will bring people together include:

- Everyone must have something significant to lose.
- The process must allow everyone to get something.
- There must be an understanding of both individual agendas and of mutual agendas.
- Early involvement in the decision making process is essential.
- Need a 'problem-shed' scale that includes local problems and local solutions.
- Must link adaptation and mitigation with water and energy.

The next steps for the Carpe Diem *Re-thinking Storage in the Era of Climate Change* initiative:

- Examine the lessons learned/being learned in the Murray-Darling Basin in Australia. The Carpe Diem project will host a conference call on **December 17, 2008**.
- Share the findings and proceedings of the November 7 Denver meeting with the larger Carpe Diem stakeholder group via email and at the next Carpe Diem convening.
- Share the findings and recommendations of the Carpe Diem project's West-wide communications audit with the larger group. (Spring 2008.)
- Re-convene the Denver stakeholder group in March/April 2009 via conference call or in person to assess possible common ground projects and determine what is needed.

Projects pending support funding:

- Further assess opportunities to link protection and restoration of key watersheds with better/more certain water supply and quality downstream. (e.g. Front Range and headwaters of the Colorado; Phoenix and the Verde.)
- Work with Western Water Assessment, CLIMAS (University of Arizona) and the Climate Impacts Group (University of Washington) to prioritize research needs and identify possible funding sources.
- Examine projects that are good partnership examples, assess the factors that made the process work and innovations; report out to the larger group.

2. **Denver Meeting - Synopsis of Proceedings**

“We need a lot more discussion with storage on the table and we need to ask ourselves under what conditions is new storage acceptable? The water guys know storage is not the solution to everything but legislators think its the solution to every problem.”

“Lawns can go dry, crops can be fallowed for a growing season - fish need water every day.”

“What if, in 50 years, flows in the Colorado Basin have decreased by ten-percent and demand has hardened? Then what do we do?”

- Comments from Denver meeting participants

A. **On the challenge before us - “What keeps you up at night?”**

The situation:

Over the next 30-50 years, there will be a significant hydrologic shift in every watershed in the West. Variability will increase dramatically; there will likely be, at a minimum, some decrease in supply, or at the least an increase in more rain/less snow; on lower elevation reservoirs the evaporation rates will rise; rising stream temperatures will lead to collapse of many fish populations; new energy development will consume large quantities of water, bark beetles will continue to devastate many forests; there will be an increasing number of wildfires leading to more water quality problems; human population growth will continue in many of the drier regions in the West.

Group discussion -

The question of public perception and the political will required - summary comments:

- The ‘institutional balkanization’ means there is increased competition in local areas - we have to find ways to ensure larger basin cooperation.
- While water managers understand the issues and problems (associated with climate change) the general public does not. The public pays the bill - we need to educate them to support any new policies or protect.
- Political landscapes need to change before we can make the tough decisions. Can this happen without a crisis?
- We have to make a fundamental shift to thinking about the whole water system, not just the component parts. This requires thinking along watershed, not political, boundaries.

How to evaluate planning alternatives (storage and non-storage) if the climate change projections are unclear or uncertain - summary comments:

- Hydrologists and civil engineers are trying to figure out what to do – ‘stationarity is dead’ – and they don’t have stable conditions. From that comes a new form of planning – scenario and adaptive management planning – that in turn requires the need to both scale up networks and to work much more cooperatively.
- Water managers need to improve reliability, but conservation and re-operation of reservoirs (e.g.) may not be enough. Policy makers think there is more value in conservation than there actually is.
- We need better definitions about possible options and their benefits; and a better understanding of the relationship between options and increased water supply.
- We need to make decisions that are informed by models, but are not dependent on them - decision makers need to make tough decisions with uncertain information.

Need for scenario planning and new decision making structures - summary quotes:

- Water managers are used to operating with uncertainty - e.g. year to year variability in streamflows. But climate change brings a different dimension of uncertainty which means we need to know the possible futures - the range of scenarios and the probabilities associated with these (e.g. risk assessment).
- Scenario planning means there is no preferred alternative, only different pathways and a time frame for when the next set of decisions need to be made.
- In the past, storage projects have been designed to tolerate a certain level of risk – under climate change, you have to accept a higher degree of risk which in turn requires the whole package – zoning, insurance, flood control management, etc. – things not in the purview of water agencies.
- Out of basin transfers are increasingly seen as a viable option for increasing water supply. These plans will require joint ventures across water agencies, basins and regions.
- In addition to climate, many other changes are coming - economic, social, values, politics. All of these need to be factored into scenario planning and risk assessment.

B. The Role of Storage

“If we don’t develop new water sources (storage and/or transfers) then municipalities in our service area will just go buy water from ag.”

“If new projects are built there has to be a commitment to base flows, and we need to factor in the carbon footprint of any new projects.”

New storage has to be on the table - it may be the only hope for some ecosystems under climate change. We (our region) can afford some supply loss, but the environment (our region) can’t.”

- Comments from Denver meeting participants

The group discussed these questions:

- Does more storage capacity lead to more water in storage? How does climate change factor into this question?
- Can we talk generally about storage or is the question all site/project specific?
- How can we make collaborative decisions? At what different levels (decision makers and the general public) do these discussions and decisions need to happen?
- Should the Federal agencies be asked to re-visit current water storage projects and look for new operating rules before new projects are considered?

“Straw-person” proposals for group discussion:

- Create new operating plans for all reservoirs (Federal included) that reflect climate change projections.
- Create new operating plans for all integrated regional water supply systems.
- Seek a “Secure Water Act” that takes a basin wide approach (using USGS basin scale), factoring in climate change, service area, ecosystem needs, agriculture needs, urban supply, etc.

Group Discussion: On the role of Congress & Federal Government

There was agreement that Congress should not make decisions for local interests but that Federal or state governments can encourage (some used the word ‘force’) groups to come together to provide the framework and funding as well as “approval stamping” at the end of the process. (e.g. the role of Interior Secretary providing the ‘overhead dangling sword’ for the 2007 Colorado Basin agreement, or in Colorado SB1177 that created basin and inter-basin roundtables to develop collective solutions.)

Could criteria be created for storage in the era of climate change - summary comments:

- Yes, because it would require action along side, or before, the NEPA process and could help ensure that more interests are met and heard.
- Congress could require all basins with federal projects to re-visit operating plans every 15 years.
- We (water agency) participated in a process with The Nature Conservancy to examine a possible ‘LEED’ type certification. Our agency finally decided we could not make those types of agreements - guaranteeing flows, and timing of flows, to the environment - under climate change uncertainty.
- For new projects, operation rules that set aside fixed benefits for the ecosystem based on today’s needs may not be in the best interest of the ecosystem 10 years from now. What we need instead are ‘ecosystem restoration accounts’ that allow for operational flexibility and allow resource experts to adaptively manage ecosystem assets (e.g., flows) on new projects as conditions change over time.
- It’s not clear that criteria could apply to all types of projects. But it does need to be clear that there are other options besides new storage/reservoirs.

C. On the role of “alternative” storage

Question: What is in the “storage toolbox”?

- The group developed a list of different types of storage from potable and non-potable water recycling to developing strategic water banks. (see addendum.)

Question: What are the impediments to implementing these diverse and flexible options for storage?

- The group develop a list of the key impediments ranging from balkanization and fragmentation of interests, to lack of funding, to the difficulty of monetizing environmental benefits. (see addendum.)

What might be some of the solutions, or what might lead to solutions - summary comments:

- Congressional political leadership; Federal oversight and agency coordination.
- Linking growth and land use decisions to water supply and availability.
- A good, old fashioned, full bore crisis - e.g. a severe, long-term drought or a 5.1 earthquake in the San Francisco - Sacramento Delta.
- Addressing the underlying assumption for growth - e.g. that if you build it, there will be water for it.
- Agriculture can store water that in dry years can be used - under a cooperative agreement worked out in advance - to provide water to urban areas.
- We need to remember that each solution has unintended consequences - e.g. many solutions, even adaptive ones, use energy, much of it from fossil fuels.

Question: Was is the role of resilient ecosystems in storage? Is it correct to assume that if you protect the headwater ecosystem that you can mitigate the impacts of uncertain, or variable water supply? If this is true, then what is then the role of public land managers?

Summary comments:

- Could upstream landowners receive payment for revegetating streams? Widen stream corridors for flood control? (e.g. Colorado Basin salinity control - 85% of the hydro-power funds come from the lower basin for work in the upper Basin. Other current revenue streams are in the Farm Bill.)
- Watersheds are part of our (water agency) ‘infrastructure’, but we don’t have the tools to manage them effectively.

Is it possible to develop criteria or process to determine the value of a forest for ecosystem services? summary comments: (group noted that this would require a new direction for the USFS - an emphasis on water rather than logging, mining, grazing. Private land owners could be compensated for good watershed management.)

- We need to consider how climate change will affect forests - e.g. the bark beetle.
- Valuation is very difficult - but if we could develop better methods that would lead to better projects.
- Watersheds are mostly on public lands so our water agency can't do anything with them. We do however work with public agencies to improve water quality.
- We need to have a value for the whole ecosystem and a value for the component parts.

Would it be beneficial to create criteria or a process to choose between traditional storage and options that improve ecosystem services? Summary comments:

- Optimization decision models used in California can enter monetized ecosystem benefits and see benefits and costs of different operations. The model has its problems, but it allows consideration of many values and tradeoffs in a systemic way.
- If we want to maintain native fisheries, we need to maximize connectivity. If storage is dams, connectivity is a problem - at the very least ladders are needed. There are places where built storage enhances flow below dams (e.g. the Trinity River in California). On the Russian River (California) off-stream storage will enhance connectivity and environmental flows.

D. Research needs

The group identified an initial list of research needs, to be further developed by the lead science organizations:

- Effects of climate change on biological systems (e.g. forest succession, hydrology.)
- Hydrologic relationship between ground water and surface water; the use of ground water as storage; and, the ecological and hydrological effects of ground water pumping when connected to a surface water system.
- The relationship between forest conditions, snow pack and water flow.
- Basic data gathering - stream flow, temperature, water quality (e.g. the work the USGS used to do before being de-funded.)
- A better understanding the 'big picture' - systems and integration among issues such as economic and social drivers.

E. Proposed/actual storage - possible common ground opportunities

The group identified an initial list of possible projects that either have been developed/there is disagreement on how they are operated and/or being expanded; and new proposed projects. See attached for complete list.

Addendum

A. People

In attendance at the November 7 Denver Meeting:

- George Beardsley, Denver Water
- Tom Buschatzke, City of Phoenix
- Susan Daggett, Denver Water Board
- Jeff Drager, Northern Colorado Water Conservancy District
- Pat Ford, Save our Wild Salmon
- Kathy Freas, CH2M HILL
- Terry Fulp, Deputy Regional Manager, Bureau of Reclamation
- Holly Hartmann, CLIMAS, University of Arizona & Carpe Diem Project Team
- Rick Holmes, Southern Nevada Water Authority
- Tom Kaesemeyer, Gates Family Foundation
- Melinda Kassen, Trout Unlimited
- Doug Kenney, Western Water Policy Program, U. of Colorado & Carpe Diem Project Team
- Eric Kuhn, Colorado River Water Conservation District
- Jim Lochhead, Brownstein Hyatt Farber Schreck
- Jessica Lowry, NOAA/Western Water Assessment
- Steve Malloch, National Wildlife Federation & Carpe Diem Project Team
- Bart Miller, Western Resource Advocates
- Steve Roberts, California Department of Water Resources
- Derek Sandison, Ecology Department, State of Washington
- Brad Udall, Western Water Assessment, NOAA & Carpe Diem Project Advisor
- Marc Waage, Denver Water
- Steve Whitney, Bullitt Foundation & Chair, Consultative Group on Biological Diversity & Carpe Diem Project Team
- Robert Wigington, The Nature Conservancy
- Kimery Wiltshire, Exloco/Carpe Diem - Western Water & Climate Change

Not able to attend - interviewed/otherwise instrumental in developing the initiative:

- Dave Gutzler, University of New Mexico & Carpe Diem Project Advisor
- Dennis Lettenmeir, Climate Impacts Group, University of Washington
- Lillian Kawasaki, Water Replenishment District of So. California & Carpe Diem Project Team
- Anne MacKinnon, Wyoming Water Development Commission
- Rob Masonis Trout Unlimited
- Mike Purcell, Wyoming Water Development Commission
- Karin Sheldon, Western Resource Advocates
- Fran Spivy-Weber, California State Water Resources Board & Carpe Diem Project Team
- Lorna Stickle, Portland Water Bureau, City of Portland
- Anne Watkins, Office of the State Engineer, New Mexico (ret.) & Carpe Diem Project Team

B. The “Storage Toolbox” - Group ‘Brainstorm’ List

- Recycling for potable and non-potable
- Rainwater capture (not legal everywhere; can have negative consequences to surface or groundwater in non-urban areas.)
- Incremental development - e.g. in Colorado we don’t know who has what rights to the Colorado undeveloped water.
- Regionally interconnected water systems - entities working together
- Strategic water banking/reserves (statutory in New Mexico)
- Cloud seeding
- Dry year leasing and fallowing
- Efficiency, especially with thermal electric plants (wet to dry)
- Tamarisk removal
- Brackish desal (large cost and can have negative impacts on the environment)
- Coal bed methane produced water
- Transfers, exchanges, and partnerships
- Coordinate land use decisions with water planning
- Pricing
- Adjudication and administration (accurate measuring)
- Behavioral changes: patriotism (do what is best for all/conserves); metering/pricing; hardware (efficient appliances); habits
- Incentives to encourage integrated regional planning (e.g. 300k AF supply created in California through this process.)
- Groundwater - re-charge
- Energy subsidies - crop, electricity, biofuels
- Ground water/surface water cooperative management

C. Impediments to getting any/all of the above done - Group ‘Brainstorm’ List

- Energy costs - pumping, treatment, desal
- Lack of markets for water leasing
- Lack of ground/surface water integration
- Tie between revenues for water districts/sale of water - agencies’ budget based on sales
- Lack of perfect climate information (agreed not achievable)
- Balkanization of water/other agencies, ‘silo mentality, lack of leadership, fragmentation - agriculture, municipalities, federal, etc.
- Plumbing to convey water to where it is needed
- Some (some in the group said all) interstate compacts
- Legal code: “use it or lose it”; water rights not secure/defined/quantified
- Difficulty of monetizing environmental values
- Changing values: outdated frames of how we think about water; knee jerk “whisky is for drinking/water is for fighting.”
- Competing federal interests - e.g. tribal and ESA
- Money for projects, processes, science, etc.
- Governance - need to develop IRPs in coordination, need adaptive management
- Institutional capacity - e.g. few people in agencies working on climate change.
- Coordination - e.g. 19 Federal agencies work on water
- Coordination between land use and water planning

D. Projects - New, Proposed, Revised Operations

The group identified a list of possible projects where common ground decision making processes might be developed among stakeholders and/or existing projects that should be assessed for what was learned in the decision making process. Note: ***Inclusion on this list in no way implies that the organizations represented at the Denver meeting support, or otherwise endorse, these projects.***

Existing:

MWD Diamond Valley - CA

Drop 2

Elkhead - enlarging - CO

Wolford Mountain - CO

Chatfield - flood reallocation - CO

Aquifer storage - AZ water bank

Snake River Plain (ESPA) ID water bank expansion

Proposed:

Sites Reservoir - CA

Temperance Flats - CA

Shasta (raise walls) - CA

A. Million proposal Flaming Gorge project - CO

San Juan Apache - settling of water rights by building a new reservoir

Transfers/proposed:

SNWA - Virgin River

SNWA - northern NV groundwater transfer

St. George - UT

Bear River - UT