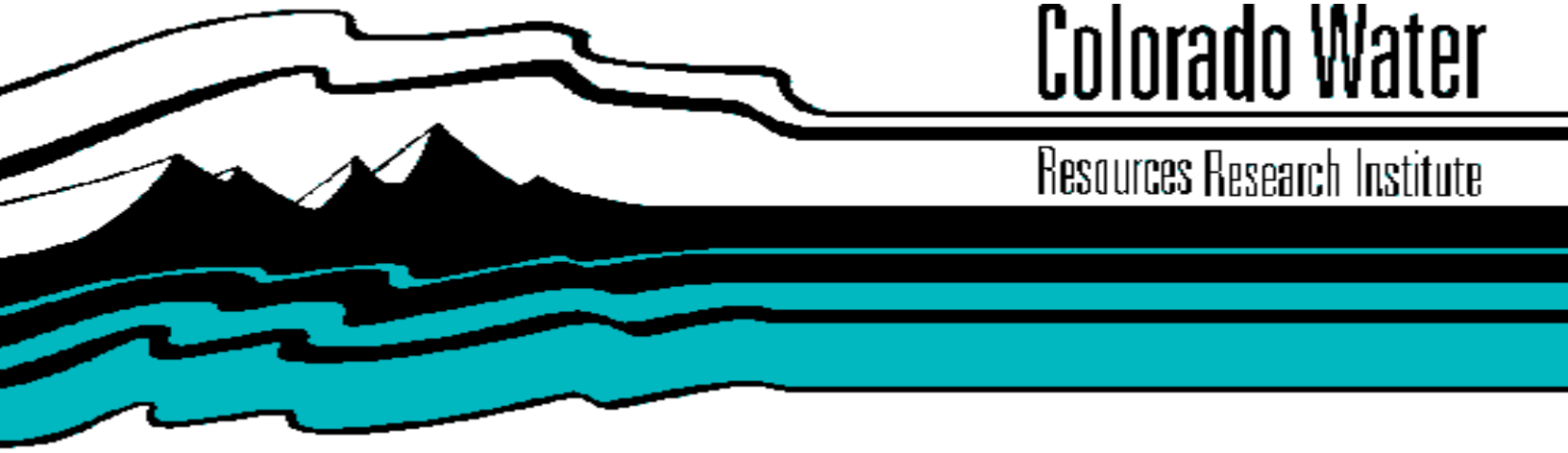
PROCEEDINGS: COLORADO WATER WORKSHOP, QUENCHING THE URBAN GIANT

Presented by

Western State College of Colorado
Gunnison, Colorado



Information Series Report No. 78

Colorado State University

PROCEEDINGS:
COLORADO WATER WORKSHOP

JULY 20-22, 1994

Presented by

Western State College of Colorado
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QUENCHING THE URBAN GIANT

Colorado Water Resources
Research Institute
Colorado State University
Fort Collins, CO 80523
Robert C. Ward, Director

Information Series No. 78

INTRODUCTION

The 19th Colorado Water Workshop was held July 20-22, 1994 at Western State College in Gunnison, Colorado. The workshop focused on the challenge of providing water for its growing urban and suburban population and the following questions: Will additional storage be built? Can systems integration and conservation reduce demand for new supplies? Will farms and rural communities dry up to quench the cities? How could bypass requirements, instream flow needs, and public trust issues affect urban supplies?

Thanks to the assistance of the Colorado Water Resources Research Institute, a printed volume of the conference proceedings is available. Western State College thanks and commends all sponsors of the Colorado Water Workshop for their support of education on water resource issues.

--Lucy High
Director, Colorado Water Workshop
Gunnison, Colorado

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QUENCHING THE URBAN GIANT

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Municipal Water Planning in a Regulatory Environment

David Little

Denver Water

My talk is titled, "Municipal Water Planning in a Regulatory Environment." To begin, if anyone thinks they know the right way to plan for municipal water supplies, I believe they are kidding themselves. Denver doesn't definitively know how. The process of planning is changing rapidly. Denver has reviewed the different planning methods in search of the most adaptable process. That is what you are going to see reflected throughout my talk.

I've broken the talk into four sections: first, *Denver's Regulatory Success*, to give you some idea of our past success in the regulatory environment. This section will also give you some idea of what qualifications I have to talk to you today; second, *Regulatory Issues*, those that we see facing us in our planning process; third, *Denver's Planning Process*, contained in the handout, and then a Conclusion.

Since 1950, Denver has been 83 percent successful, in the regulatory process. That's pretty good. Since 1970, we've been 80 percent successful. That's not bad. Since 1980, we've been zero percent successful. Some of the regulatory issues we are facing as we move into our long-range planning process are listed on the handout. The one item most troubling to the planning process is that regulators won't engage in meaningful discussion until a project is proposed. You can't get regulators to sit down and talk through the issues before a project is proposed. The federal laws don't provide for that type of pre-NEPA issue resolution. Now, some of them, like Lee Carlson, will sit down and talk with you any time; but generally you don't know what the federal agencies are going to require until you get into the federal process. That can be disruptive if you go though a long process of planning, and the Feds come in at the last minute with things you haven't thought of.

Another thing that is important is good science. Good science is critical. You should not skimp on good science, but you have to recognize that even with good science some regulatory decisions will be made based on things other than science. Primarily, the things that come into play are public perception and pressure from special interest groups. Pressure from special interest groups comes from a lot of arenas; federal regulatory agencies are deathly afraid of a lawsuit. So, a threat of a lawsuit can push a federal regulatory agency in a direction.

Another thing that is somewhat troubling to us, and that we have seen in the past, is halfway though your project or your proposal the rules will change. You don't know when they are going to change; you just come to a meeting and all of the sudden you find out the rules have changed. Then you have to quickly adapt. Sometimes you are successful, sometimes you are not.

Many of the water projects that are proposed for permitting are very complex. A project applicant spends a lot of time educating the regulators. Then the regulators move to another state. So right in the middle of your process, you have new people to educate. Sometimes the regulators who make the decisions are not educated about your project --that's troublesome.

Finally, and probably most importantly, even if you do get a permit, the regulatory qualifying language eliminates all your certainty. That has been troublesome to a lot of people recently. I have a couple of examples here I pulled out of recent permits. Fish and Wildlife Service: "Reinitiation of formal consultation is required if new information becomes available, or a new species is listed or a critical habitat is designated." You have to ask yourself the question, " If you get that type of language in a permit do you have any comfort, any certainty to your permit?" The Forest Service language: "This permit may be amended in whole or part by the Forest Service, when at the discretion of the authorized officer, such action is deemed necessary or desirable." **Desirable?** "To incorporate new terms, conditions and stipulations as may be required by law, regulation, land management plan or other management decisions." As you can see, just from the basic boiler plate that is included in the permits, uncertainty is introduced into the process.

From Denver Water's standpoint, we are starting a long-range planning process. Some of the things that we feel are important to consider during our planning process are listed on the handout. We believe that

any process must be capable of handling uncertainty, because of what I mentioned before and the issue of requiring bypass flows from historic projects. A lot of uncertainty is being hoisted on municipalities. A planning process must contain an honest public information and involvement effort. That is probably the most critical part, to have the public involved and informed early on in the process. It has to be meaningful information and meaningful involvement. They have to actually be part of decisions. A successful planning process must equally consider supply, demand and effluent options. No longer do we believe an entity can go forward and only consider supply augmentation options. You have to look at all options available to you, and you have to develop the tradeoffs of each option so that they can be fairly compared. That is very critical for the decision maker and for the public. The planning process must be NEPA compatible. Denver is beginning a three-year planning process. If our planning process does not consider NEPA issues, we may have to start over again. This would waste time. That's why we're concerned about the federal agencies not engaging early on. Finally, a planning process should help Denver determine which of its resources to use for meeting its primary service obligations.

Before we started a new planning process we felt that a review of our past planning environment was important. We found some interesting things--generally in the past everything we had to deal with from a planning standpoint was fixed. Our existing system yield was fixed, regulatory requirements were fixed, basically, everything was fixed. The one exception was our service area. Denver's service area was constantly expanding, so our demands were constantly expanding. The planning environment today is the inverse of the past. We have one fixed item; that's our primary service area. Our board has identified a primary service area that it has committed to supply. But, everything else in the planning environment, is variable, generating a lot of uncertainty. That's why any planning process we use must be able to handle uncertainty.

Another thing we have to consider--Denver has a lot of resources, both raw water resources and treated water resources. As more people in the metropolitan area recognize that fact, they are coming to Denver and asking, "Can we have some of this resource, can we have some of your spill water?" or, "Can we have some of your system capacity?" Denver doesn't know which of its resources are needed for meeting its primary service area needs, let alone what, if any, resources are remaining. Therefore, our planning process must identify which resources are needed for Denver's primary service area.

This time we thought it best to try planning a little differently, by using a process which encourages public involvement. We convened a group of experts from across the country and asked them, "How is planning being done today in the water utility industry?" Generally, the method identified was Integrated Resource Planning. Integrated Resource Planning is the technique Denver is using for its long-range planning. IRP has been used by the electric utilities for many years. But, only recently have water utilities started to use this technique. From our standpoint, Integrated Resource Planning means that we are integrating three resources: source augmentation, demand management, and effluent management. We think it's critical that you give these options equal consideration. Water utilities can no longer just plan to construct project after project after project. Water utilities must look at all the resource options available to them. I have a little more detail on each one of these resources.

Source augmentation -- There is nothing new here. You've all seen it before. Denver has reservoirs that could be enlarged. New on and off-stream storage is always an issue; conjunctive use of ground water and surface water is going to be seriously considered; even the most evil of all from this part of the world--additional West Slope diversions--will be considered. The process is an open process, so other options are going to be identified by the public, hopefully, and we will be considering those as we go through the process.

Demand management -- Demand management has two components. First are end-use efficiency measures, which include xeriscape, plumbing retrofits, public information and other items. Second is the temporary curtailment of water use during dry times. For example, when Denver lists a firm yield of 315,000, that means that its water system can supply 315,000 acre-feet of water each year of the three-year drought in the '50s, without curtailment. So, one of the questions we need to answer is, "What if we count on temporarily curtailing demand during those type of droughts?" Another way of saying that is, "How much risk of water use curtailment during droughts will the metropolitan area be willing to accept?" This is one example of a resource that Denver is going to explore during its IRP process, which has never been done before.

Effluent management -- also has two components: direct reuse and exchanges. An example of direct reuse is treating the effluent to potable water standards and serving customers or using the effluent directly for irrigation purposes. We all know what water exchanges are.

This slide shows the Integrated Resource Planning process. Key components are the resource division guidelines. We are going to work with our board and query the public to develop the resource decision guidelines. It is critical to get a good, sound set of resource decision guidelines because from those guidelines come the evaluation criteria to be used later in the process. The demand management, source augmentation and effluent reuse options which have been identified are put through a fatal flaw screening process. The idea is to screen options that don't make sense. An example is the option of towing baggies of water down from Alaska. This is a real proposal I have on my desk. Once the gross fatal flaw screen is completed, then a detailed analysis is conducted on the remaining options including developing each option's trade-offs. Do the homework, so to speak. Once the individual options have been analyzed, they are combined into logical resource strategies. This is where different options are put together--effluent management, demand management, and source augmentation options are combined into a reasonable number of resource strategies. The whole idea is to develop a menu of resource strategies to be used in planning for the uncertainty.

The result of the IRP process is not a straight-line, where option a is followed by option b, then c, and so on, because of the need to account for the uncertainties we face in the future. For example, if the initial action was to develop Phase One of a Reuse Project, we will probably start to implement that option when the water is needed; but, then we would have an uncertainty in our future, a regulatory outcome. We don't know whether we are going to be required to bypass a lot of instream flows or small amount of instream flows, but we can't allow that to stop us, because we must plan for both eventualities. If we are required to provide high instream flows, then we would be on a more aggressive development program, because our yields would be less. If we have a low instream flow requirement we would be in a less aggressive development posture.

Similarly, our demand forecasts--we have to check-in with them periodically. We cannot project demand; no one can project demand. When you're looking into the future the best you are doing is guessing, so you have to check back once in a while. If your demand projections are accurate, you follow this center path. If your demands are higher than you projected, you would follow the high path, or the low path if they were lower. This is how you can account for the uncertainty that all water utilities are now facing.

These are some conclusions that I want to leave with you. By doing a long-range planning process, we risk the claim that the data we develop in this 36-month process will be stale when we enter into a federal process. We have heard that before--that the data is now four years old, therefore you have to do it all over again. That is a real risk, because we are going to spend a lot of money to do this process, and it would be a shame to get to the end of it and be told the data is stale. It is almost a disincentive to even do the process of this type. But, we need to figure out how to work through that with the regulators.

Our process will only work if people get involved, and if they get involved early. If you come in when we file for a permit and start complaining about the permit, then you are just being troublemakers. If you want to help solve a problem, you must get involved **now**. You have to sit down, go through the brain damage and you have to help us form the plan. If you are interested in solving problems you start now. If you are interested in causing trouble and being rabble rousers you'll wait until the last part of the process like the federal agencies do. Even if we get through the process and get everyone on board with us, there is no guarantee that the federal agencies are going to give us a permit. That's an uncertainty that we don't know how we are going to get through, but we're committed to doing good work, doing a reasonable approach and seeing what happens when we come out the end.

I talk to a lot of people in the water utility industry and they're saying to me, "Boy, back in 1950 those were the good ol' days, those were the good ol' days. Dillon dam, we built Dillon dam and we did the paper work afterwards. Those were the good ol' days." Well, I would like to leave you with a Carly Simon quote, "These are the good ol' days." Thank you.

Questions and Answers

Q: My name is Jerry McDaniel. I'm an attorney from Durango, and my area of practice is water. A couple of years ago, I had the privilege of taking a field trip with people from the Denver Water Board. Chips Barry was there, I think he was just newly on board, and a question I asked him at that time was, "Was the Denver Water Board or the staff of the Denver Water Board talking with the metro planners in the metro Denver area, and coordinating the concept of growth in the metro Denver area with the availability of water resources, be it effluent or whatever the resource was?" The only comment he had was very vaguely along the South Platte River, yes, otherwise no. Can you address that issue two years later? Is it still no; is there more cooperation-- more talking between the water resource people and the local or the planing officials? The second question is: Would your life be more certain if Denver was blessed by an intra-state compact, wherein it was allocated a finite supply of water from the Western Slope for the next three million years?

A: I seem to be here without my attorney. Your first question first. By the very nature of water in the metropolitan area there has been fragmentation, because there are different entities that supply water. Recently there has been an attempt, started by Governor Romer, it's called the Front Range Forum, where we are all sitting down and trying to work through the issues associated with water in the metropolitan area, and looking for opportunities to cooperatively operate our systems to the benefit of all. In that is a look at Metro Sewer's issues. Metro Sewer has some very real concerns with water quality, as you might guess. The farmers downstream of Metro Sewer are also very interested in water quality. We are looking at all that in the Front Range Forum; so we are starting, I guess you would say after two years.

A: The answer to your second question is it depends on who drafts that compact as to whether it would give me any certainty. Certainty in water supply is a thing of the past, in my opinion. I think that water supply issues are so controversial anymore, and the federal agencies are now looking at reducing existing systems yields to such a great extent that there is no certainty, and I don't think a compact of any nature would give us any certainty.

Q: (Unknown) I want to ask about your comment on the importance of meaningful public involvement. Could you elaborate with a few specifics on how to achieve the public involvement in the first place and how you would incorporate that into to your decision making process?

A: The idea of public involvement and how you do that is a science in and of itself, and I'm not an expert on that. We're planning on contracting with a very capable consultant to do that, but I'll try to answer your question. Meaningful public involvement in my opinion is more than telling the public what you plan to do. It is asking them early on, and taking their comments seriously and incorporating them to the extent they are reasonable. In a nutshell that is meaningful public involvement, to me.

Q: I'm Pete Clangsmith, a lawyer here in Gunnison, and my first question is five-fold. First of all, I have great admiration for the work that the Denver Water Board has done. It has been very efficient and certainly up-to-date. It has done the job that was necessary, so my first question to Dave is what amount of water does Denver own under its conditional decrees on the Colorado River?

A: I don't know. Do you know, Bill? No I don't know.

Q: The second question follows the first question. Is that enough water for your foreseeable needs?

A: I don't know. I'll take the 5th. I don't know.

Q: I think the next two questions will be answered the same way. That is, what will it take to achieve and put into pipes those conditional decrees?

A: Some of the projects that we have on the drawing board are big projects that are horrendously expensive. They have been on the drawing boards for years and years and years. So, some of them are

very expensive. One the things our process is going to do is look at all those resources, and determine which of those we need to use for our build-out and see if we need them all, so you are asking me some questions that are about three years too early.

Q: That really answers the next question, "What are you doing to satisfy these requirements?" In other words, are you actual in the process of beginning to build any dams?

A: The only dam that we are associated with that is under construction right now in Wolford Mountain Reservoir. We entered into an arrangement with the river district on Wolford Mountain Reservoir, so that's the only thing we are remotely associated with; other than that, no.

Q: My last question is, "Have you considered a theory that has been developed here on the Western Slope, (Ralph Clark has been very prominent in this) and that is the idea of CARP, c-a-r-p? " The idea of going down below Grand Junction and pick up the water after it's been used on the Western Slope and piping it back up highway 70 and then distributing whatever amount is available, which could easily be determined after it has been used on the Western Slope. Has any thought been given by Denver of that project? Does it have merit?

A: If you get involved in our process and you say we need to consider that project we would consider its merits.

Q: What efforts have you taken to get your own customers involved? Its easy for a lot of external entities to get involved in Denver's public process and public involvement, but what kind of response do you expect to see from your own customers?

A: We have a citizen's advisory committee at Denver Water, and working through them we have all ready had one public meeting, workshop, trying to get the word out. We are going to continue doing that through the newspapers-- trying to get people interested. The problem with this type of planning process is, most people are not interested. There is not a lot of controversy involved, and people don't want to come down at 7:00 pm unless there is something controversial or the rates are going to be raised. We don't know. The way we are viewing it is we need to give the public, our customers in particular, the opportunity to participate in this process, and we are going to do everything we can to give them the opportunity. Our experts are telling us that in all likelihood we won't get a lot of participation from our customers.

Meeting the Future Water Needs of Colorado Springs

Gary Bostrom

Manager, Water Resources Planning
City of Colorado Springs

Today, I would like to describe the Colorado Springs system and talk about the issues that we are facing and the process that we have identified to address those particular issues.

A little background on our particular system. Colorado Springs is located on the Front Range. We are similar to Pueblo and Denver and other municipalities in the sense of our climate, but as far as water resources go we're not similar to these cities, in that the city is not located on the South Platte River or on the Arkansas River. We're located on Fountain Creek, which is a tributary to the Arkansas, and because of that physical location we have been required to go great distances to develop water over the years.

Local projects are located around Pikes Peak, and include reservoirs on streams that are tributaries to Fountain Creek. Our trans-mountain projects include Homestake, Blue River, Fry-Ark and Twin Lakes, various projects that collect water on tributaries to the Colorado River and convey water to the Eastern Slope for use. The Colorado Canal Companies are located east of Pueblo in Crowley County and the firm yield with those companies is about 14,000 area feet a year. The Arkansas River Exchange and local exchanges are exchanges that allow the city to convey trans-mountain wastewater effluent and give that water to downstream irrigators and take other water out upstream. When you think of trans-mountain water, we get the benefit of the first use as it comes through the Continental Divide and to the city where we are able to use it once. But then we have subsequent uses, because we have the legal entitlement to reuse it, and you can see the value it is to us today, and what it means to us in the future as far as undeveloped supplies. We do have some additional undeveloped supplies, and those are in the forms of conditional decrees that we have that can be developed over time. Our total developed supply is about 130,000 acre- feet. To put that in perspective, the city currently uses about 74,000 acre-feet a year, so there is about twice the supply related to the current demand.

Our collection system covers a large area. We have had to rely on delivery systems to get water to Colorado Springs. Following is a history of Colorado Springs water development. The city began to develop Pikes Peak water supplies back in the 1890s. By the 1940s most of those waters had been developed, and in the 1950s the city constructed the Blue River Project, which is on the north side of Hoosier Pass just south of Breckenridge. In the 1960s the city joint-ventured with the City of Aurora in the construction of the first phase of the Homestake Project, which is on tributaries to Homestake Creek, which is tributary to the Eagle River. In the 1970s the city purchased majority ownership in the Twin Lakes Reservoir and Canal Company that diverts water out of tributaries to the Roaring Fork above Aspen. In the 1980s the city participated with other El Paso County water providers in the Fountain Valley Authority, which purchases water from the Frying Pan-Arkansas Project. Also, in the 1980s the city purchased majority interest in the Colorado Canal Companies, which are east of Pueblo, and also decreed the Arkansas River Exchange. The 1980s represented a decade where there was a lot of work in developing water supply, and that is why you see the large supply as compared to the demand you see today.

Again, we need the three delivery systems in addition to our local system to get the water to the city. Even though we have 130,000 acre-feet of firm yield, we are limited by the local yield and the capacities of the existing delivery systems. That is the challenge that faces us.

It is very interesting thinking through what might happen to Colorado Springs and El Paso County over the next few years. We currently estimate that about 320,000 people live in our service area and use about 74,000 to 75,000 acre-feet. This is a very important number right here, because by the year 2010 this is the capacity of all of our pipelines and our Pikes Peak system together, so that is what we can provide, about 445,000 people at today's use patterns. Then by the year 2040 we are looking at the possibility of growing to about 600,000 people using about 138,000 acre-feet. That difference is about 30 MGD (millions of gallons per

day), or we would need to bring 30 million gallons a day into the city by the year 2040. That is what we are using as planning criteria.

To address these issues we are heading on two fronts: the technical front, looking at the range of alternatives that we can identify, and then the public process front. You heard David Little talk about Denver's public process. Public process is very important as we go through this, for regulatory reasons and also because our citizens are more interested in what we do and how it affects not only their lifestyles and what happens in El Paso County, but possibly in other areas as well.

I would like to share with you just some of the studies that we have done. I won't go into great detail, but I want to give you a feel for the spectrum of studies we are looking at. In 1989, we began to look at major pipeline systems, reservoir and pipeline systems, to convey water from the Arkansas River to Colorado Springs. That included and identified the Elephant Rock site some of you may be familiar with north of Buena Vista. Elephant Rock was identified in that particular study, and we filed for that water right for various reasons in 1989. Instead of building additional storage, we have looked at the possibility of enlarging Pueblo Dam. We have done a study on that and identified the pros and cons.

As I mentioned, we have done the population forecast and we have looked at water use. How do we use water? On the demand side, how can our customers use less water? As we talk about water use, conservation is part of the key. We will use water conservation in meeting a portion of our future water needs. Speaking about conservation, we have been metered since the 1940s, so we have been active in water conservation for quite a while. I would like to point out our xeriscape demonstration garden that was built a couple of years ago and was recently recognized by the Bureau of Reclamation. This last spring, the Bureau awarded us their national water conservation award for that garden. It is used by our customers to get ideas on how to have low-water landscaping in their own yards.

The Frying Pan-Arkansas Project evaluation is a study where we have looked at the Fry-Ark Project. There is about 300,000 acre feet of storage along the upper basin of the Arkansas River, from Turquoise, Twin Lakes and Pueblo. Out of that 300,000 acre-feet we are looking at ways that we might be able to contract or use a portion of that instead of building new reservoirs. We think this holds real promise, and we plan on looking into that some more.

The last item is water reclamation, and that's the other end of the spectrum of alternatives. That's taking our wastewater effluent from trans-mountain sources and treating it and putting it directly into our potable water system. It is rather expensive, but we have spent a fair amount of time looking at it because this is one way we can use our trans-mountain wastewater effluent independent of an exchange and use it directly. We would discharge wastewater effluent into Fountain Creek, let it flow down 12 or 15 miles, pick it up out of Fountain Creek and possibly run it through a water reclamation plant, which is a high-tech water treatment plant that is able to treat wastewater effluent. The water would then be stored, possibly in a reservoir southeast of the town of Fountain, and then it would be pumped up and possibly put in another reservoir and treated again, and then conveyed into the distribution system for use. We are also looking at non-potable water use. We use about 2,000 to 3,000 acre feet of non-potable water on golf courses and parks, and we are looking at extending that system also.

Some of the studies we have going on right now are existing system improvements. That's where we are looking at our existing system and looking at ways that we can make improvements to defer the need for a big delivery system. When we talk about a pipeline system from the Arkansas, we are talking in the order of 300 to 500 million dollars and that is on the low end. There is one alternative from Crowley County that would be on the order of 800 million dollars, so it is in everyone's best interest to try to defer these large pipeline systems if possible. We are looking at ways that we can improve our existing delivery systems, things that we can do locally to more efficiently use our system. We have updated our raw water delivery study, that 1989 study that really kicked off this whole process. In 1989, we estimated that we needed about a 60 MGD system, and as we did additional population and water use studies we cut that down to 30. Because we have gone from a 60 MGD system to a 30 MGD system, we have gone back and resized the alternatives to convey water to the city of Colorado Springs.

The last study I would like to discuss is the socio-economic evaluation of alternatives. This falls into the technical realm and into the public process realm. We are going into the communities of Buena Vista, Salida, Pueblo and Colorado Springs to find out what the issues are. What do people think of Elephant Rock? We have had focus groups in all of those communities over the last two months. Based on those focus groups and the issues identified in those focus groups, we are doing phone surveys now to get a broader response from those communities. They were well attended in Buena Vista, Salida, and Pueblo, where people are very aware of these issues. They were not as well attended in Colorado Springs, reflecting on David's comment on public process; getting our customers involved. That is a challenge for us. We hope to get our customers aware of the issues and involved in the decision making process.

So, that is the technical side of it. I would like to switch gears and talk about the public process, because it is equally important or possibly more important to understand what the concerns are and what the issues are, not only with our own customers but for other people and other communities. We have had a public process going on for several years already, consisting local presentations. We give presentations to local groups and schools and civic groups. We have also had public meetings in Pueblo and Buena Vista to inform them of what is going on. One of the hardest things to deal with is misinformation. In the comments we hear back from Buena Vista and that area, there are all kinds of rumors about what Colorado Springs is up to. So, it is in our best interest to try to meet with those folks and provide information about what we are actually doing to help them understand the process. As I mentioned, the socio-economic evaluation is technical, but it is also part of the public process: identifying the issues of concern and also using surveys to get a representative sample of the concerns that these communities have. That is the process that we have had to date.

We have targeted the end of October or November of this year to have a lot of these technical studies done, to be able to look out in front of us and have a level playing field with a lot of different options. We hope take those options and build a water resource plan that will address the future needs of the city based on conservation, groundwater, non-potable use, possibly direct reuse, and delivery systems. We will be looking at all of those at the end of the year. Based on what we come out with, we will have either one alternative or several alternatives that we will want to take out to the public and say, "What do you all think? Give us your feedback." That is what we will be doing in 1995 as we look at it now, and this is very dynamic; public processes can change based on what is going on at the time. As we look at it today, this is how we plan on approaching it: having open houses, both in Colorado Springs and in the El Paso area and along the Arkansas River, where people can come in and see what we've done. They can review the technical process and then give us comments on what we've done. We also plan to continue having presentations that educate as much as we can both locally and along the Arkansas River. We plan on providing printed material to affected interests. If someone says they are concerned about what we are doing, we would like to have a mailing list so they can follow this process. We will be starting that, and also a responsiveness survey, and some of our other public processes that we have had for other projects.

People like to know that they have been heard. One way of doing that is when we have an open house and someone writes down a comment, we let them know that they have been heard and that the decision makers will be made aware or will see their comments or concerns. That is the public process that we are envisioning today, for next year.

Again, I have covered the schedule: completion of the initial studies or the technical studies by the end of October. We will analyze the alternatives and come up with a preferred alternative or a couple of alternatives for people to respond to. Let me say that they will be able to look at everything we have done. We won't limit what people will be able to see, but we would like to give them our rationale of why one or several alternatives might be preferred or a better way found for them to respond to. We'll continue our public process at a heightened level from February to June, and then in June, assuming that we get through this, we will have a recommendation to council. Then, based on that, we will have a water resource plan that we will then begin to implement. Some of the first phases of that may include trying to contract for storage along the Arkansas or developing groundwater or heightened levels of water conservation, before we begin looking at a permitting process for a pipeline system. I would like to emphasize that a permitting process for a pipeline system will take time. In some sense, if we had to do that by the year 2010, we might be behind schedule because it takes so long and for the reasons David pointed out, the regulatory issues. This is the process that we are going to try to get through by that time. If something comes out in the public process that we've not thought of, that time will

be delayed. There is some thought that the public process could take a year to a year and a half. We don't know, until you get into it and go through it. We will just see how long that takes.

In summary, our current water supply position is excellent, but given our limited delivery system capacity we may be at capacity by the year 2010. As a result, we are developing a water resource strategy that has the technical side and the public process side. We hope to bring those together to come up with a recommendation that we would like to make in 1995 to our council.

Questions

Q: (Unknown) This process will take a lot of time. Do you feel that you have the time to go through this elaborate public process, and what is the cost? What about previous projects?

A: One of the issues is how all of our water rights come into play. All of our water resources are valuable assets to the city. Previous efforts have been available. I think we would make them available for people who would like to look at what we have done to date as far as other projects are concerned. Let me put a caveat in that. Unless they are in litigation for some reason, unless there is a reason that it could not be shared, we want to make sure people have as much information as possible, because as I have said and David has said, the public process is very important, that people understand what the decisions are and can be involved in that process.

Q: (Unknown) Do you have any estimate of how much your current municipal demand could displace through an aggressive conservation program? You are currently using 77,000 acre-feet a year or so. What does it go to?

A: We had a study done by Montgomery Watson, the water use study of a couple of years ago. It identified some general levels of water conservation programs. Based upon that study and where we are today, we have asked Montgomery Watson to take a second look over the next few months and come up with a detailed program so that we can look at several levels of water conservation. Whether our community would want to go to a severe water conservation program on day one or early on or to hold a reserve for drought management or other purposes, I think we are going to look at a range. I can't tell you today quantitatively what percent that might be. In a lot of conservation programs today, if you can achieve seven to ten percent that is a good start. You can do more aggressive things, but there are costs, and that gets to community values. In other processes that we have been through, people really value being able to have grass and trees to some extent. Our intent is to try help them make good and wise choices and use their water efficiently. People don't want Colorado Springs to look like Tucson.

Q: (Unknown) Is Colorado Springs a member of the Front Range Water Forum around the Denver Metro area or something similar?

A: We are involved in that process. Personally, I am not involved. Philip Saletta, who is here, is involved in the Front Range Forum for Colorado Springs. We are participating in that process.

Q: (Unknown) What is the current status of permitting for Homestake II? Are you going to use the same kind of process you outlined for the Homestake II project?

A: Those are good questions. Homestake II, is an extension of the Homestake phase one project. It would take water out of the Cross Creek drainage. It has been in litigation for a long time. It is still in litigation. I can't tell you exactly where we are at. I believe that Eagle County 1041 is the primary case that is still in litigation. That project, because of many of our water acquisition efforts in the 1980s, has been pushed off. Let me say two things about that. One, if we were to develop Homestake II and all of our other water rights were in place, we are just getting more water to the Arkansas. That project doesn't provide a delivery system to Colorado Springs. That is why a delivery system is more important at this time. At the same time we are concerned about, for regulatory and legislative reasons,

if we lose portions of our other water supplies, Homestake becomes a priority or would be used to offset losses that we might incur because of reductions in other projects. That is where it is at. If we were to build Homestake II or go through a permitting process today, we would use a public process much like we are using with our delivery system or water resource planning effort.

Heeding the Wisdom of our Forefathers: Providing Water for the City of Durango

Cap Allen

Cap Allen Engineering
Durango, Colorado

Introduction

Durango, Colorado, is one Colorado city fortunate enough to be located in an area with abundant water. The seasonal rainfall average in Durango is 18-20 inches per year and up to 40 inches per year in the surrounding mountains, most in the form of snowfall. The area is green and residents of Durango have a keen desire to keep it that way. Water restrictions have not been a regular policy of the City. Water meters were installed in Durango only in the late 1970s. (There are no punitive water rates for excessive water consumers willing to pay the bill.) The Animas River, running right through Durango, has never been administered or "put on call" in its history and does not seem likely to be any time soon. There are five rivers within 25 miles of Durango, all of which lead to an impression of lushness in the arid West.

Durango is a railroad town. Founded by the Denver and Rio Grande Railroad as a supply depot in the late 19th century, the town was meant to be a fair weather base for the harsher climes of Silverton. The mining districts above that had little chance of growing crops in the winter and summers were exceedingly short. The railroad operates today as the Durango and Silverton Narrow Gauge Railroad and attracts tourists from all over the United States.

Durango is growing. The current immigration to areas from Idaho to Arizona, the West slope migration, has served to stimulate the growth of Durango and La Plata County at a very high rate. Because there are no proximal large towns to Durango, the functions of shopping, services, restaurants, motels, and recreational needs for a surrounding community of over 40,000 people (to which the tourist base must be added) is borne by a town that in actuality only has a population of about 14,000.

In the summer of 1994, Durango is in need of some concrete and quickly determined solutions to its water needs. Following a very dry June and July, the City's Florida River pipeline and its Animas River pipeline are both in duty 24 hours per day and yet the City's terminal reservoir still falls, sometimes many feet per day. The City is in the middle of its second commissioned long-term water supply study in two years to more carefully define the area of required improvements.

History

The founding of Durango followed mining in the San Juan Basin. At the outset in Durango, the Animas River was never short of water quantity, but often short in water quality. Since the late 1800s there have been recurring concerns with flows from mining wastes upstream. The early record of City deliberations makes it clear that even in the 19th century there was concern with the long-term securing of a clean and unpolluted water supply for the town. The streams around Silverton show the scarring of a large mineral load. As recently as 1978, a lake above Silverton collapsed into the mine portal of an extensive mining operation, causing 24 hours of severe mineral pollution to Durango and to Aztec and Farmington, New Mexico water supplies along the Animas.

It is not surprising that the early fathers of the City of Durango turned to the Florida River northeast of town as a water supply. The Florida (Flor-ee-da) originates in a limestone watershed that has been largely untouched by mining activity. The transition of most of that watershed to a Wilderness Area has further guaranteed the purity of the source waters. At the turn of the century the City negotiated with ditch companies and other direct-flow water users in a very organized fashion to secure the bulk of the first dozen adjudications of direct-flow water along the Florida River. In addition, the Congress of the United States on March 1, 1907, transferred ownership of the entire upper drainage shed of the Florida River to the City of Durango, which is still held as an enclave within the present Wilderness Area.

From the point of view of the early Durango planners, the Florida supply had many advantages, and the record shows that the securing of primary flow rights on the river, along with an entire watershed, was the action of careful foresight. In addition, no small advantage is the fact that the Florida, at its closest eastern approach to Durango, is 400-500 feet above the present location of the City terminal reservoir, with only a small saddle to overcome in gravity transmission to that point. It all added up to a clean, pump-free, and control-level water supply for the City. The 5MGD+/- capacity of direct flow rights and pipeline that were ultimately plumbed to the City of Durango must have seemed to be many times what Durango would need.

That flow is still very adequate for Durango's present population for eight months of the year some 90 years later! Summertime irrigation peaks at present are satisfied by a pumping station on the Animas River. Although the original wire-wrapped cypress transmission line from the Florida has been replaced, the present supply piping is completely adequate many months of the year for a Durango far different in size from that of 1907.

Regional Water Supply Development

The 1930s, '40s and '50s were the active, non-stop years of water development in the Southwest. Every river in the Durango area has had proposals over time for provision of agricultural and municipal and industrial water supply schemes. The Bureau of Reclamation file includes just about every source of snow melt and every possible impoundment site in the region. Through authorization of the CRSP and other water projects, many areas grew to expect that "they would get their project" sooner of later.

The Florida Project was discussed by the Bureau of Reclamation from the late 1930s forward. A 1940 report by the Bureau on the sizing of the project includes the City of Durango as an M&I participant and allocates water from storage for that purpose. It was determined early on that a Florida Project could supply something in excess of 40,000 acre-feet per year for irrigation, about half from direct flow and half from storage to be constructed. Into the 1950s the City of Durango was present as a negotiator in the planning for the Florida Project.

At the same time, the planning and engineering for a project that would provide irrigation water to a high plateau west of Durango along the La Plata River, called the Dryside, and provide water to the City of Durango as well, moved forward. Because this project was essentially a transbasin diversion from the Animas River to the La Plata River, it took on the name Animas-La Plata.

In the atmosphere of the time, there was every expectation that all proposed water projects would soon be built. Certainly the public awareness of the vast destruction and impact to the ecosystem of the West caused by these projects had not yet grown. The loss of the beauty of the Glen Canyon or of the Flaming Gorge was hailed as progress for all of us.

Although the City of Durango had an opportunity to participate in the Florida Project, they had every reason to believe that "their project," the Animas La Plata, was imminent and would serve their needs. In the early 1950s the City finally declined participation in the Florida Project. Although many Bureau of Reclamation projects have provisions for payback of municipal and industrial costs for those kinds of water users, the Florida Project repayment contract proceeded with no such provision.

The Florida Project was constructed in the early 1960s and provides nearly 20,000 acres with direct flow and irrigation water in an augmented supply that could not have been depended upon in dry years previous to the project. It was constructed for $11.5 million.

The Animas La Plata project was authorized, but has yet to be constructed. It would be the last hurrah of the Bureau of Reclamation construction era if built. It is only a shrinking handful of optimists that still consider the project as conceived to be a possibility. The entire nature of the project has changed, and what was once an agricultural irrigation project now attempts to be the mechanism by which a settlement of Indian Water Rights claims under the Winters Doctrine is effected. Final cost of the Animas La Plata is projected at nearly $700 million.

Durango's Alternatives

The Animas La Plata project is involved in a protracted approval process that is complicated by environmental claims including endangered fish species. The present, most optimistic, schedule would not put a pump station, storage reservoir and water supply on line in less than seven years after commencement. Given the one to two years delay still likely, Durango cannot expect water from that project before 2001 or 2002 under the best conditions.

Durango will continue to grow in the interim and cannot afford to be further ill-prepared for water supply demands. Certainly, by the above dates, Durango's demand will have so far out-stripped supply that a substantial alternative supply would have to be in place. That alternative supply should be considered as a stand-alone project that will not need Animas La Plata augmentation at all. An alternative that appears to be quite logical from an engineering standpoint is the Florida River supply. As is the case in so many Western water issues, a detail is that someone else owns that water. Political constraints aside, the Florida supply is clean, the watershed is controlled, a large storage dam and reservoir already exists on stream, and the supply to the City of Durango is by gravity pipeline. Filtering costs from the clean Florida river are much lower than for the summertime use of the muddy Animas River.

The Florida Mesa is prime agricultural land. It is also prime dwelling land. The views from the mesa are spectacular, and the cost per acre commanded for residential use is far greater then the value per acre for production of hay and livestock. The platting of residential lots, while many receive the irrigation water previously allotted to the farms on which they lay, has steadily compromised the irrigation delivery system. Durango proper is a land-locked, geography-constricted spot, and the Florida Mesa is certain to provide the development acreage demanded of a powerful immigrating market.

At some date in the future, the agricultural need for irrigation water from Lemon Dam will have been reduced, while at the same time the urban and suburban demand will have increased. This is an old story of the transfer of water in Colorado from agriculture to municipal use. The trick is to keep pace with the slow attrition of agriculture, and not effect a change that causes an agricultural decline of itself or that causes hard feelings amongst irrigators and non-irrigators.

The water that could be transferred to municipal use on the Florida Mesa is not an alarming amount. Present projection of the City needs for 20-30 years are for about 4,000 additional acre-feet supply. This represents only ten percent of the Florida Project's delivered 40,000 acre-feet of direct plus storage flow. That much water may be recoverable through conservation programs alone.

The "New Bureau"

There have been stated accounts of the new direction the Bureau of Reclamation is taking, applying its expertise to the optimization of existing water projects and water conservation rather than the old role of construction giant. While it appears that effecting that internal change within the Bureau may take quite some time, the apparent desired result lends itself well to the proposed joint water use by the City of Durango and the Florida Project (via the Florida Conservancy District).

The Bureau of Reclamation has a large staff and a wealth of base information on the Florida Project. There are numerous methods by which the project could be a multi-purpose one. There is some sprinkled irrigation on the Florida Mesa, but not much. There is adequate head to operate substantial sprinkler systems just through delivery with little expenditure of electricity. Reducing transmission losses and improving delivery methods could cut the present consumption of water in the District. Initial talks with Florida Conservancy District members have elicited a desire for a more efficient and tightly run water system.

Threading the Bureaucratic Pathway

The institutional barriers to arranging a joint use of the existing Florida Project by the City of Durango and the Florida Conservancy District appear to all but doom the concept. The repayment contract written between the Florida Conservancy District and the Bureau of Reclamation includes no provision for municipal and

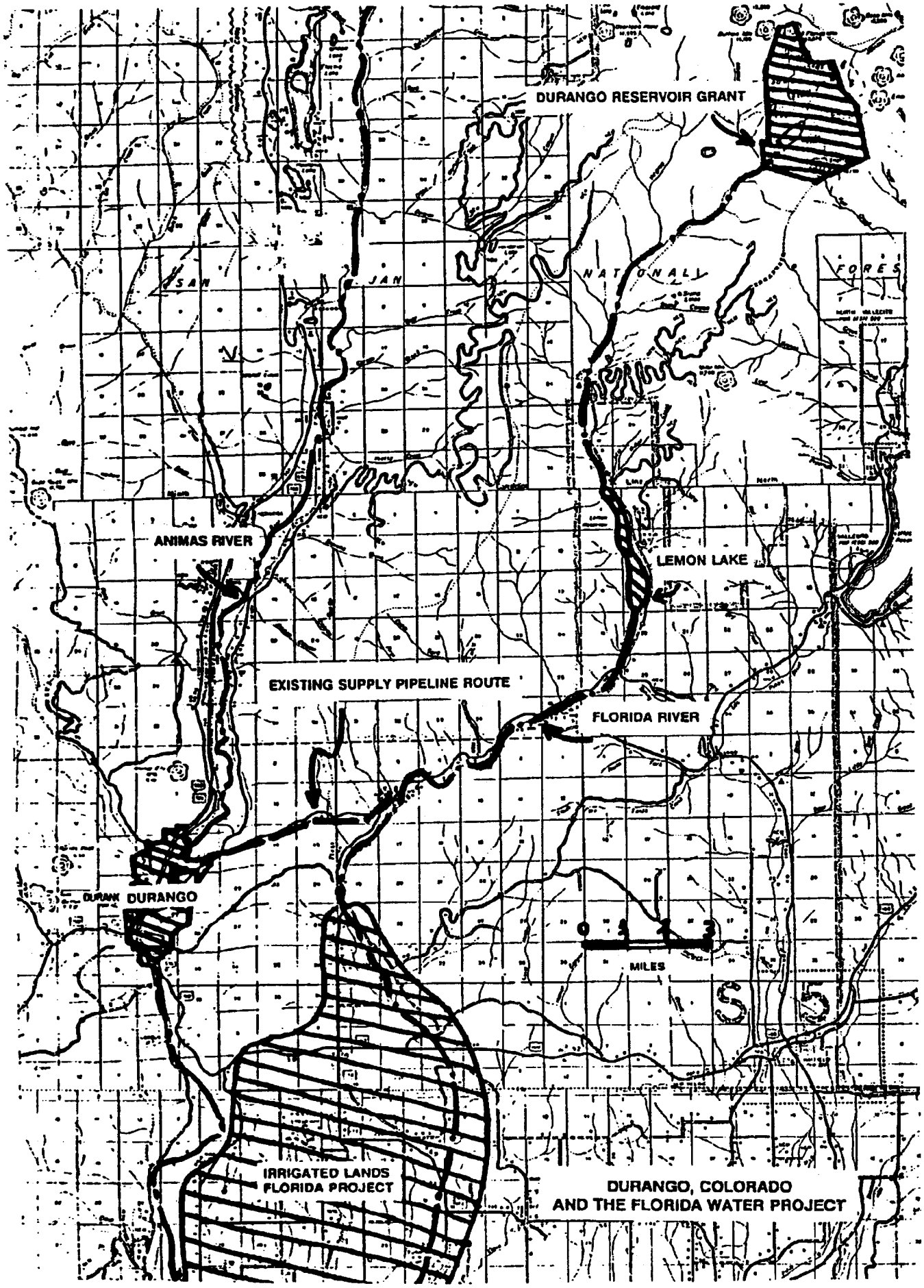
industrial participation, which must repay project costs at a far higher rate than irrigators. The Bureau of Reclamation needs to be willing to aid in the renegotiation of a contract with the U.S. Government.

The farmers and irrigators of the Conservancy District need to be convinced that the City of Durango is not attempting a water grab. A win/win partnership needs to be developed, and the first steps in such a subjective effort cannot be clearly defined. Initial negotiations may need to spend significant time in simple understanding of the desires and capabilities and needs of each group to help eliminate misunderstandings later on. The City of Durango has a stated policy of not annexing properties simply for the sake of increasing the property base and control of the surrounding region. It may take some time to make suspicious outlying residents believe this.

Even though on the surface of this discussion it would appear that environmental impacts are relatively minor, those impacts need to be addressed. Further transbasin diversion of water results in less return flow and less overall water for habitat that is now taken for granted by waterfowl, and wetland and riparian dwelling flora and fauna. Minimum stream flows on the Florida that have been established by the Colorado Water Conservation Board adjudications need to be respected. New seasonal uses of water that have no history need scrutiny by the Water Court.

The Future

An excellent water supply lies within Lemon Lake at an 8,000-feet elevation northeast of Durango. The utilization of that water has decreased with the decline of agriculture and the increase in land division. Substantial funds were expended to construct the Lemon Dam, and large environmental impacts have already occurred as a result of the project. It is certainly prudent to have in mind a logical transfer of the use of that water to a ready municipality in step with the decline of irrigation use. The tricky part is keeping one process from getting ahead of the other.


DURANGO RESERVOIR GRANT
ANIMAS RIVER
LEMON LAKE
EXISTING SUPPLY PIPELINE ROUTE
FLORIDA RIVER
DURANGO
MILES
IRRIGATED LANDS
FLORIDA PROJECT
DURANGO, COLORADO
AND THE FLORIDA WATER PROJECT

Questions and Answers

David Little, Gary Bostrom, Cap Allen

Q: (Jerry McDaniel) When you say the Lemon Lake water is not utilized for intended purposes but it is not wasted, what do you mean? Secondly, regarding development on the second mesa with the small ranchettes moving in, what will the water supply be for it?

A: (Cap Allen) First, regarding the supply to the mesa -- if you did just a ditch head analysis of where all the water is going on that mesa, certainly it is all accounted for. Someone has written down where every bit of that water goes. Someone in my business has the ability to snoop down at the other end of the system quite often, however, and a lot of that water just runs right through the system and doesn't get used for irrigation purposes. The system has some delivery problems right now in certain areas of the conservancy district, getting that wet water to those areas of the district. So I would get a very strong argument from a rancher that lived in that particular area if I told him there was plenty of water. But in general, the water that goes to that system could be used a lot more efficiently. A lot of it seeps right back to the river. You could say that is good return flow; people are depending on that return flow; but there is not that much evidence that down the river itself return flow is an important issue. The Florida River flows back into the Animas about 15 miles south of Durango, so the Animas from that point on augments the Florida River flow substantially. Users downstream of that probably are not affected by return flows very greatly.

The second question, what are they using now for water, is actually an important one because that is what we would like the district itself to look at. Do they have a role in the development of water supply for the future? Right now there is no water supply out there. Right now it is wells. This is a mesa that is elevated some 600-800 feet above the surrounding rivers. Interestingly enough, the wells all operate out of a shallow alluvium. Fifty-seventy foot deep wells are a very common story. Most of us are fairly suspicious that those wells have a strong relationship to the irrigation water that flows down there in the course of the year. Should that irrigation start to slow down, those wells may disappear or start to slow down, and you get into this cycle that if we can all see that far ahead we would see that a central water supply using that water would be a pretty good idea.

Q: (Janice Sheftel) I am wearing my tribal hat first as general counsel for the Southern Ute Indian Tribe. The tribe is important on three stream segments that Cap mentioned today. The first is the Florida, because the tribe subordinated its early 1868 priority to other priorities of the Florida River. It got an allocation of project water. The tribe also is counting on return flows from irrigation in its subordination of some of its irrigation rights, and those haven't been put into place yet but they are the right entitlement of the tribe.

In addition, the tribe needs to be a player because also they are on the Animas River. It is not just Cap's questioning the building of the Animas-La Plata project. That is the major component of the settlement of the Southern Ute Indian Tribe's water rights on the Animas and La Plata Rivers. When you look at that project, that is taking water out of the water-rich Animas River, taking it to the La Plata basin. On the other hand, in Cap's proposal we are taking water from the water-short Florida River and taking that over to the Animas basin.

With my tribal hat, I am also concerned about the Pine River. I realize that Cap was not actually proposing that solution of taking out of the Pine, but a major beneficiary of the Pine River and the Biceda Storage Project is the Southern Ute Indian Tribe.

So, I would very much suggest that in any solution for the Durango water problem, the tribe has to be a player and their water rights in the Florida, the Animas and the Pine all have to be considered. If we are looking to a quick solution for the City of Durango for its water supply, I am afraid we don't have it.

We also don't have a quick solution if I wear another hat which is as counsel for the Southwestern

Water Conservation District. I am afraid that in that hat Cap is likely suggesting that we do away with irrigated agriculture on the Florida Mesa and we will have development there -- not just three-acre tracts but much more intensive development. I guess I see a problem with that, because when you look around the state the Colorado Water Conservation Board is just meeting now talking about water supply which doesn't take irrigation water and change it to municipal use. I think this community here is facing the problem of drying up of irrigated agriculture and what keeps the environment in Durango, Gunnison or other areas green is irrigated agriculture. How can we keep irrigated agriculture, make it profitable, and all of us benefit from it? How can we all help in that process and not take that water and give it to cities? In my Southwest hat I would also like to say that glossing over the issue that this water belongs to other people is a pretty major gloss. There is a waiting list of people for irrigation water, it is my understanding, out of the Florida project.

Also, glossing over the issue of dealing with new Reclamation is a pretty major gloss also. I think among the issues that would be raised would be some increased rates from the project to those who already have water. I am not opposed to studying alternatives. I am very pleased that Lloyd Gronning for the city is studying all these alternatives. I just want to say that this was suggested as a quick solution and I am not sure what we have here is a quick solution.

I also would like to say that I have a hat as a "We." Cap talked about the "We." I am a resident of the City of Durango and so in that hat I am concerned about our water supply and our whole environment and taking the water from a water-short area to a river that has never been on call and drying up the limited amount of irrigated agriculture we have around the city. I am sure I probably could wear a number of other hats in this response. The city has not yet received its report on this alternative and other alternatives. There are other people here from our area who might want to respond, but in my hats I am glad we are looking at this, but we can't gloss over the major problems of taking other people's water and changing the whole pattern of use on the Florida River for the benefit of the City of Durango.

A: (Cap Allen) I have now had it. I don't have any hats. I would say that one of the advantages of making a presentation like I have made is I am me. I am not speaking from the point of view of any agency. All I just told you is what I thought should happen. I have been amazed, since I first came out with these thoughts publicly in Durango maybe four or five months ago, how many fellow travelers have jumped in next to me. I am by no means a Florida Conservancy, let's steal their water movement. I don't represent anything of the sort. As a matter of fact, I think I am very acutely aware of what a difficult process this will be if in fact it ever is. To answer first the issue with the Indian concern, maybe I glossed over that too quickly by not saying Indians in particular, but I think in general when I tried to couch the concerns of probably 500 agencies at the end of my comments about the transbasin diversion flows, the impacts of minimum water flows, the wealth of involvement of water attorneys and water engineers, that is what I was referring to. The Utes are just part of that equation. I think that the Indians are a very important part of that equation, and certainly did not intend to say that they weren't important players, but I think there are a lot of other important players in this idea too. I think they all have to come to the table. It will be a very difficult process.

The second issue, drying up of agriculture, I don't want to suggest that. I think that if any of you understood the maps I showed you in the process that we have going on with development in Durango, it is going to do it by itself. We don't have to hurry it. I don't think Durango is in a position of going out and stealing someone's water. I don't think we have to do that. I think we can time it so that Durango's water use rises slowly as agriculture sinks slowly. Certainly if this room had 10, 15 or 20 irrigators from the Florida Conservancy District I would be behind bars or out the window by now, but you have to be able to make those statements. You have to be able to say, "Look, guys, this is realistic. This is the future. This is what's happening. Can't you see? Your friend just sold his 200 acres into 60 three-acre lots, and those guys haven't got a clue how to distribute that water. Last year they turned it off because they said it was a pain and they're not using it anymore." Those are the kinds of trends you are going to see. I am not saying that entire mesa is going to stop using water, but I think it is important to remember the ratio I am talking about: 40,000 acre-feet of water goes down through that mesa in the course of a year, and the city at 40,000 people. Durango right now is 13,000-15,000

people. Anyone who has been there lately will realize that 40,000 people in Durango is a lot of people -- would only need one tenth of that water, 4,000 acre-feet. So it is not a giant water grab; it is not taking everyone's water.

The last thing I heartily agree with. It is not a quick solution. I think I am very realistic. As a matter of fact, I think it took someone like me to suggest this kind of effort, to look at this alternative, because I don't have anything to lose. I think it probably looks so depressing in terms of its outcome that had a public official gotten behind that and pushed this idea, he would have been heavily criticized for wasting everyone's time. It turns out that probably I am the only good vehicle for at least looking at this issue. But I don't think it's a quick solution. I think it is a five or ten-year solution, at least, and maybe more.

Q: (Jerry McDaniel) Our law firm represents the Florida Water Conservancy District, so we are right in the middle of all this. I would like to try and focus the debate a little. I am not sure either side quite hit the points completely. It is very conceivable, I think Janice and Cap would both agree, that the Animas La Plata project and some sort of municipal supply of water out of Lemon Dam are not incompatible because the Florida Mesa is not in the Animas La Plata District. The City of Durango would like to service all the water needs in the area for other reasons: tax base, and all of you who deal with municipalities know what that is like. But I don't see that they are necessarily mutually exclusive projects. Janice, you might correct me if I am wrong, but I believe the Utes' interest in the Florida is 600 acre-feet? That is not an insurmountable number. It has to be dealt with, but it is not an insurmountable number. There is a possibility that a municipal subdistrict for the Florida Water Conservancy District could be formed.

I think the issue of taking irrigated agriculture out of production, as Cap has pointed out, is not like Denver or some municipality buying up large tracts of land and drying those farms up for a municipal supply of water. The point is that there are more and more houses being built on the mesa right now on land that was irrigated. The legal problem is that the ownership of the water is a proportional interest. Farm A that is still irrigating has, for every acre-foot he is allotted, 1/27,000th of an acre-foot for his acre-foot of water. So if you abandon some water somewhere, he, just in a theoretical sense, keeps ownership of that water. That has to be overcome. I think that solution needs to be looked at. Cap and I shared a client that tried to develop a subdivision. Their wells were objected to by the adjoining subdivision. This is addressing the question of how you supply water to the mesa, and it is all by wells and shallow aquifers. That cost the developer thousands and thousands of dollars to fight the objection of the neighboring subdivision on well-to-well injury. The solution is some sort of central system on the Florida River. It will help manage the growth. We have a county commissioner here who is concerned about that, and it will help to mitigate these costly water court battles.

The last thing that was not mentioned is the methane contamination. If that really becomes an issue on the mesa, a central system could help alleviate that problem.

(Moderator) You brought up a theme that I sensed running through some of the presentations, and just for a moment before we break up I would like to ask for a response from David and Gary. The water belongs to somebody else when everyone is planning for it. How do you get from A to B? Gary [Bostrom], you were working with some of the communities on the Arkansas, and David [Little], you were looking far out, and I am aware, although I think you just touched on it, of some of the projects you are involved with in terms of working with communities on the Western Slope -- the same kind of thing you are working with, Cap. I would appreciate a few comments on how you deal with situations where basically you are taking away something, or somebody feels extremely strongly about losing what they regard as their future.

A: (Gary Bostrom) For Colorado Springs, the water rights that we have we have primarily over time purchased local water rights from around Pike's Peak. Then, on the transmountain systems, either appropriated it ourselves so it was not a taking except through what Colorado water law allows. In the '70s we did purchase water with Twin Lakes and then in the '80s we did purchase Colorado Canal shares from one individual down in the Crowley County area. So, I guess in a sense there is a market that we have relied on. We have not condemned nor taken water from people who have not wanted to

sell. There are, you need to recognize, some indirect effects on other people in these areas that can create some concerns, but generally speaking, that is how we have acquired water to date -- either through appropriation or purchase from other folks.

A: (David Little) We do the same thing, but whether you have a water right or not tends to not be the issue. If you are going to divert water out of "someone's stream," they view that as their water whether you have a legal right or not. That becomes problematic, and we just have to work through those issues and work with the local community to see if we can meet some of their concerns. It is an issue that doesn't reside in the legal arena; it resides in what people feel is a value issue. That is the way we need to approach it.

A: (Cap Allen) We have considered the idea of purchase of water rights outright like Colorado Springs and Denver, but we really haven't gotten to the point of considering it in great number. Durango's water rights that it has right now on the Florida River were collected in a fashion probably very similar to the way you could do it today. Right at the turn of the century the city went up and talked to many of the ditch companies and simply purchased the oldest water rights on the Florida. I really don't understand or know the politics that occurred at the time, because the City of Durango went up to a river that is water-short and basically purchased the first 10 or 12 rights on that river. The City of Durango has the senior rights on the Florida River direct flow; that is a little bit different from the storage issue of Lemon Dam. So at that time there must have been some fireworks, because the 9, 10, or 12 cfs that the City of Durango can use out of that river is very often more than is in that river. If that happened within five or ten years after the purchase, there were some fireworks. I guess what I am proposing is that the same kind of fireworks could happen down the road here too.

Growth and Water Supply - Should One Determine the Other?

Comments by

Lynn Murray

Principal, Huthinson Building Corporation
Lakewood, Colorado

Growth is inevitable. The early days on the Front Range were harsh for the pioneers. In 1878 Isabelle Bird wrote, "I looked from a considerable height on the great 'city of the plains,' the metropolis of the territories. There the great braggart of 16,000 souls lay spread out upon a brown and treeless plain." President Grant said that this land was "uninhabitable." Many of the diaries about the early settlers coming West to Denver reveal a telling story. Some wrote how they were anticipating a difficult crossing of the Platte River only to find a dry sand bed and no trees for their firewood. Others tell of how they found the Platte so large that it was impossible to cross in many places. These pioneers were writing about the same river, a river which at times was almost impossible to cross and at other times was a near sand bed. Yet the pioneers still came. As settlements sprouted, they established as their first priority the development and control of water. By managing the runoff from the snowmelt and constructing reservoirs and diversion tunnels, we have developed a Front Range environment which has gone from uninhabitable to well-planned communities serving more than half of our state's population. In addition, the storage and wise use of our water resource provides constant base flows and great, diverse new ecology where previously only a dry prairie existed.

By allowing the marketplace to function as we have, we now live in communities that are well-planned and on a per capita basis impact the environment much less than in the past. In the Denver metro area, the quality of life is among the nation's best. The climate has attracted many people to the area, and the infrastructure -- airports, water distribution and sewage treatment facilities, parks, sports complexes, educational institutions, hospital and health care facilities, utilities including the new information highway, and railheads -- these are among the nation's best. The Denver metro area supports over half of the state's population in what could be called "a socio-economic sense of well being," and does this using less than three percent of Colorado's available water. At the same time, approximately one-third of Colorado's unused entitlement of Colorado River Water flows out of the state unadjudicated.

It is not a question of water availability; it is a question of negotiating access to the supply. The world population is presently over 5.5 billion and by the year 2010 is projected to be over 7 billion. The United States population presently is over 260 million and by the year 2010 is projected to be over 300 million. Colorado has a present population of over 3.5 million. By the year 2010, it will receive its share of new growth projected to be nearly 4.5 million. Metro Denver now has approximately 1.9 million people. By the year 2010 some project it to be over 2.6 million people. Like the early pioneers they will come. It is the job of the builders to provide shelter for these new families. If there is not enough water for new homes, they will vote for people who will provide the water supply for this basic human need. The quality of life for Coloradans would best survive by allowing the metropolitan areas to service their people with water in an orderly manner as they have in the past.

I believe that in the future, the wisest use of water resources and the environment would be to allocate a greater percentage of Colorado's available water supply to the cities. This would enhance their abilities to function as viable population centers and thus help maintain an acceptable standard of living for millions of Colorado inhabitants.

This standard of living is important for economic, social and environmental reasons, because only an affluent society can afford environmental causes. Third-world countries would be hard-pressed to implement even the most basic environmental plan that we have in place in Colorado. By focusing growth where the infrastructure exists, we preserve a large portion of our state's wilderness and ecologically sensitive areas. This would accomplish the most good for the greatest number of inhabitants with the least environmental impact. Without maintaining a prosperous and viable economy the business climate would deteriorate, the tax base would

decrease, and as the population continued to increase additional economic resources would be allocated to critical social welfare requirements. "Idealism" and "Good Causes" take second place when foraging for food and shelter becomes a common cause. I am afraid that a scavenged environment and the depletion of natural resources will increase drastically if we do not meet the challenge of preserving our human environment. The water development required for additional growth is a relatively small investment when considered against the alternatives.

The challenge is not water development, but population control. If people choose to live here water will be provided for them. If you can stop people, not so much at our borders but in or near our water basins, then no water will be developed. However, without this control in a democracy basic human services will need to be provided. The question, therefore, is how to best manage our water.

(Lucy High) For those of you who walked in late, I just presented Lynn Murray's remarks who was unable to join. Hopefully that will give something to fuel the discussion with the two presenters who are here.

Growth and Water Supply - Should One Determine the Other?

Comments by

Jack E. Holmes

Vice Chair, Holy Cross Wilderness Defense Fund

My answer in the largest sense is yes, it should, if we know what is good for us as a society. In order for this to work, we need to start thinking in new ways. Technological changes are making it feasible to have less urbanization; Colorado could work toward more imaginative ways to claim compact rights to include reserve, leasing, and environmental uses; new urban water users should pay their full costs in an atmosphere of public consensus; and openness and small projects in less environmentally sensitive areas are good strategies for the future.

Everyone knows that we can prepare for water needs years in advance and still present attractive growth opportunities for new residents. The people in this audience clearly have the technical ability to do so.

But someone needs to ask the most basic question of all. Should we do so and how? I will venture the opinion that preparation should be as natural as possible. That is, we should keep newly-developed water in its native basin except in case of an emergency drought -- in which case a state authority could be authorized to approve new transfers. If there is to be any other exception to this, I believe that it should be a project approved by a vote of the citizens of the entire state during a general election.

Before I make this argument, I need to state that, although I teach at a small college in Michigan during the school year, I am part of the third generation of two Colorado families, have lived on both the east and west slopes, and have worked for a Member of Congress from the state. I am not an outsider trying to figure out what is best for Colorado.

I also have worked for over a decade as an officer of the Holy Cross Wilderness Defense Fund, which is a coalition of some 1500 members dedicated to preserving the integrity of the Holy Cross Wilderness. We have members whose political orientations range from liberal Democrat to conservative Republican, so I must stress today that I am speaking as an individual and not as a result of any group consensus.

In order to make my argument, I need to note that trans-basin water development using Colorado River water for cities has not worked very well in the largest sense. The two biggest cities with air pollution problems in the United States are Los Angeles and Denver, and the availability of municipal water from the Colorado River Basin has contributed to both problems. Whenever there is an earthquake in the Los Angeles area, one has to wonder about the wisdom of packing so many people into such an earthquake-prone area. The amount of crime in both metropolitan areas at least leads one to wonder if the best quality of life is promoted by having such big cities.

This is not to lay the sins of America on water development. It is to question why water policy should in any way facilitate the growth of large cities. However, I do want to say that water policy alone should not bear the burden of stopping growth. There needs to be some way of preserving Colorado's compact rights for the future without adversely affecting the Colorado environment in the present. Maybe the answer is to finally study, in a serious manner, the leasing of water to downstream users. Such leasing could produce some needed revenue and might even be conditioned on the lower basin states' long-term reduction of use of Colorado River water to originally specified compact levels. The Colorado Water Conservation Board could increase instream flow claims, but that is not now recognized as a consumptive use in terms of compact rights. Would our compact partners be willing to accept a change whereby it was agreed that Colorado's non-consumptive conservation uses could be changed to consumptive uses for Colorado later?

Developing Colorado's existing and potential reserves maintains some compact rights. This makes sense. The problem is that it might require changes in the compact -- changes which could be substantially and harmfully influenced by the obvious power of the lower basin. After study of alternatives there might even be a need for one or two new reservoirs. Why couldn't Colorado change its law to promote reserves and conservation use by having multi-purpose reservoirs in places where a lot of water could be captured for a lot of purposes? Such reservoirs would operate best and be allocated most fairly under state authority. What I heard in the first session is that Durango needs new water a lot more than Colorado Springs does right now, based on current supply. I will concede this kind of need from the viewpoint of political practicality.

Again, it needs to be stated that California is not better off for getting all of that out-of-basin water in the Los Angeles area. Would it not have been better to have more California growth where there is more water? Concentrating growth where there is insufficient water can be done, but it might not be the best solution.

One probably need not be as worried about growth in Colorado as in California, but one can ask whether the growth and concentration of our population along the Front Range is the ideal solution. There are good reasons, such as air pollution and social deterioration, that lead one to wonder.

To be sure, what I am proposing requires some major changes, but I believe that these are needed for the good of the state. Why can't the State of Colorado declare that conservation, reserves and preservation of endangered species constitute beneficial uses under Colorado law, which could then be consumptive use in the future? That would be a good start for future negotiations.

Why not make water diversion a subject of public vote in the state at large? We vote on whether cities can have legalized gambling and how much we can be taxed. If water is the most important issue in the state, why not get the opinion of the people? The need for such approval would do much to get the water community and the public on the same wave length, and not do so in a superficial manner.

The concept that the State of Colorado, rather than a local water authority, might operate or build a water project for the good of multiple users is worth studying. In the largest sense, knowledge that water in the Colorado River and its tributaries is available for emergencies might reduce some of the incentives and pressures on communities to build for the worst case.

In the past it might have been necessary to have large cities simply because of the need to concentrate resources efficiently. However, this day might be past. The largest retail revolution of our time came out of Bentonville, Arkansas in the form of Wal-Mart. They went into the cities last. Wall Street Journal reporters can live in Vail, Colorado and write stories as if they were in New York City. I can write letters in a cabin without electricity and send them on the same day to Michigan via modem. The advantages of the big city are on the decline.

This does not mean that cities are a thing of the past. Rather, it means that the West, which already is the most urbanized part of the country, might not need to become any more urbanized and that some functions might be decentralized. Certainly, it makes little sense for the urbanized areas of the West to encourage growth as in the past. Rather it makes more sense to include the true costs of growth in cost structures.

If adding customers to a water system really costs $20,000 a house, should that tap fee be subsidized by current users? If a community with a natural water supply can do if for $5,000, so be it. While this might make it very costly to move to urban areas, the rural areas would pick up some slack and the net cost to society would be less. If someone really needed to live in a big city, they might find it more attractive to rehabilitate housing than to buy new housing.

It is obvious that the major sources of new water for cities in Colorado are trans-mountain diversion or the transfer of current agricultural water. Both types of water acquisitions have their costs. Those need to be fully calculated, and fully public.

The first trans-mountain costs involve transferring water. When these projects have been built in the past, most often they have involved gravity feed tunnels that remove water from resort areas. Such tunnels have

a funny way of doubling in cost during construction, and then being relatively low cost once in place. This provides little or no incentive to save water. Trans-mountain diversion projects that would require pumping would give a greater incentive to save water on an annual basis. They also would be easier to locate outside of wilderness areas and resort areas, and they would not be as harmful to tourism, one of this state's most valuable resources. Maybe there should be an annual fee paid to any resort area that is to lose water. If that were required, I suspect that water projects would be located elsewhere. If there are other major costs, such as payments to Mexico for degraded water or a need to preserve the Colorado Squawfish, those should be included.

This is not a big brother planning-type argument. Rather it is an argument to restore market forces for an environmentally desirable result. It would not be long before some companies would see the advantages of locating in a small or medium size town where more water is available than in a big city. Those businesses who needed to be in a city would, of course, stay or locate there. Retirees might find it much better to live in Grand Junction than in Denver. Economic and personal forces should be left to decide such matters.

My suspicion is that government would be the last to adjust. In view of the large number of government people in the audience, I ask that you not judge this concept on the basis of whether your agency would leave Denver for Gunnison. It might not. After all, Denver and Washington are the sources of public money. But a service center for a large computerized bank just might. For government to move to rural areas, a patron like Senator Robert Byrd of West Virginia -- who has tremendous political power -- might be necessary to initiate the action and later provide the requisite funds. Even he is having trouble getting federal agencies to come to West Virginia, although costs are lower than in Washington, D.C. Once a trend toward this kind of movement is started, though, the impact could be tremendously positive.

Another cost of trans-mountain diversion is a lack of harmony in the state at large. The way that this situation might be mitigated is to require a vote of the people to support any new trans-mountain diversion other than to deal with a genuine water emergency. Requiring such a vote probably would result in a lot of healthy discussion about other options available to Colorado.

Giving the State of Colorado authority to deal with water emergencies by using not utilized water would be an improvement over the current, decentralized system. Water redirection or the location of dams at sites that are currently unused and have some unappropriated water -- such as existing compensatory reservoirs or sites like Wolcott in the Eagle and Colorado Basins -- could establish Colorado's title while minimizing environmental degradation. The water could be saved for when it is needed. Amending Colorado law to promote compact title to water could be done.

At a certain point, agricultural water from within individual basins will be required for urban growth. Again, the cost structure of such water should be inclusive. If entire communities are to be impacted, those purchasing the water should pay accordingly. Urban use might be higher priority, but rural areas should be compensated in order to diversify their economies. If removing Arkansas River water is going to make Rocky Ford into a prairie grassland, then Colorado Springs should pay Rocky Ford for the degradation as part of the cost. Now, perhaps, it is time to note some wise actions that Colorado has taken in the past few years. There was little sense in getting involved in a bidding war over the United Airlines maintenance center. Nor was there a lot of sense involved in paying a lot of public money to get Ziff-Davis Publishing Co. to move to Douglas County. If people and industries want to move to Colorado, they should pay the true costs.

Front Range cities such as Aurora have started conversation programs that deserve credit. That is an important step in the right direction. If enough water could be saved, tap fees could be used as a reserve fund and new sources would not need to be developed in the immediate sense.

A logical next step is full and open disclosure of the costs of water acquisition and development. Water districts should be required to disclose their current water assets and expansion costs to all citizens. My impression is that current water often is inexpensive and that the overhead and cost for new water is underestimated. The only way we will know for sure is if the water budgets of the municipalities and water providers involved are opened. This does not mean telephone books of information, but rather data that clearly shows the cost of each source of water, particularly by distinguishing between old and new water. If most of the overhead cost of a department is devoted to new water, that should be shown as well. My guess is that we

would find new water is much more costly than we ever thought. If so, tap fees should be raised accordingly. If we are concerned about ability of certain individuals to pay, perhaps tap fees could be lower for those who agree to a progressive rate structure. New users of non-essential irrigation water in urban areas could be charged in such a manner as well.

There is an argument that the new growth and taxes are good for the future, meaning that people who move in now are the valued taxpayers of the future. That is possible, but moderation is much better than the boom and bust growth that has so often characterized cities. Above all, gearing everything to future growth -- reminiscent of the style of the 1920s stock market -- should be avoided.

The national government does have a role to play in all of this. As the manager of federal lands impacted by these water projects, it makes some sense that they should strive to minimize damage to their land. This would seem to suggest that they ask for alternatives in the largest sense and reject projects that do not minimize damage. Strict enforcement of environmental standards could lead to some rethinking.

The Holy Cross Wilderness Defense Fund was formed when it was realized that the Forest Service and other federal agencies were not going to take what we considered an environmentally sensitive view toward the possibility of water projects on federal lands in general, and the Holy Cross Wilderness in particular. We had hoped that the special provision of the 1980 Colorado Wilderness Act that created the Holy Cross Wilderness about not adding to or detracting from water rights would be taken literally. When it became clear to us that Front Range viewpoints were likely to lead to project approval, we organized.

There now is a movement to try to settle issues to the satisfaction of almost all involved. That must be, I submit, the future in terms of trans-mountain diversion and even agricultural transfers. The day when things could be done without a public consensus might have passed.

When water projects are needed, it perhaps is time to think of little projects will small impacts. Such projects can accommodate growth without requiring visible environmental damage. One example of such a project is the water connected with the Climax Mine, which is at the head of the Arkansas, Blue, and Eagle drainages. The site is easy to improve, water could be taken to any of three locations, and there are inconspicuous locations to put small reservoirs. Other possibilities include snow fences, such as those on Independence Pass, and some trades suggested by computer analysis.

Whatever we might prefer, our generational orientation toward grand solutions doesn't go with college-age students who are beginning insist on smaller projects in keeping with modern technology. The so-called boomers, who now are gaining control of government, are not getting any younger, and the next generation is very suspicious of boomers. If the literature is to be believed, this next generation, the so-called thirteeners, will insist on less grand solutions than we have had in the past. In the same vein, it is logical to expect that they will not be as demanding of immediate answers as their boomer parents. But they will want the technology to be used, and they will want it to be done as small and inconspicuously as possible.

In my opinion, the net result of policies such as those that I have advocated would be that water would help control growth in concert with market forces and that the result would be beneficial. This could be accomplished without the interference of big government.

There needs to be some rethinking of what has become conventional wisdom. More imaginative ways of claiming Colorado's compact rights are needed. Full costs of the development of new urban water should be charged to the new customer in the form of tap fees that reflect the full costs. If this leads to a population that is spread out more than in the past, that is good. There needs to be more information available to a public that is more involved. It is possible to delay such rethinking and to stonewall it for a while. However, it will not be possible to do this over the long run. Why shouldn't the water community be ahead of the times?

What I have suggested is a way to have the free enterprise system, the water community, the public, and government agencies work together to help the Colorado of the future. I suggest that it is time to start.

Growth and Water Supply - Should One Determine the Other?

Comments by

James R. Sullivan

Commissioner, District II, Douglas County

I am going to start off by saying that I agreed with part of what Jack had to say. I think the mold that Front Range counties and commissioners are often cast in is not really correct. I see three or four other commissioners here as well as myself: Shirley Baty from La Plata County, Rick Hum from Summit County, Rikki Santarelli from Gunnison County. We all work together in Colorado Counties, Inc., for the common good as we see it for counties within the State of Colorado.

There seems to be a paranoia or a mind set that if you're from the Front Range you want to steal Gunnison's water. My daughter lives 10 miles north of Gunnison and she says, "If you're on that damned panel to steal our water you can't stay at my house tonight." And then there's a bumper sticker that's probably a little more obscene about Aurora. I think that is a mind set that we all have to forget, and the reason I say this is, if you look at the topic of this conference, "Quenching the Urban Giant," my question to you is, what " Urban Giant" are we taking about? Are we talking about the Front Range, or are we talking about Los Angeles, Southern California, Arizona who every year get 800,000 acre-feet of water free from the Colorado River, water that originates in our state? Is that the "Urban Giant" we are talking about?

Yes, Two Forks was defeated; I wasn't a great proponent of it. I believe in water projects; we all do. We need to conserve and do a lot of things. Yet I don't think that Two Forks was the ultimate answer. One aspect that troubled me terribly was the $6 million funded into the Sierra Club to fight Two Forks. That $6 million came from the Real Estate Development communities of Southern California and Arizona.

Which "Urban Giant" are we going to quench? I think quench means take care of somebody's thirst. Very honestly, I think we are getting stolen blind, and the commissioners that interface through Colorado Counties are very well aware of this. I hear Jack speak of a statewide vote. Do you know what a statewide vote would do for water in Western Colorado? Take another look at Colorado -- 85 percent of the population is in the seven metro counties of Denver. Western Colorado would lose so fast it would make your head swim. I wouldn't advocate that. We need to do something, but I think that it must be a cooperative effort.

Another "Urban Giant" that scares me terribly is the Federal Government. Federal Government: how about the U.S. Fish and Wildlife saying that 1,200 miles of the Colorado River will take care of endangered species? How many folks out there in Western Colorado can't irrigate because we have to keep enough water for a Snaildarter, or a Humpback Chub. I don't know. I guess you talk about baby boomers; I'm a late bloomer. I remember what bloomers were.

You start taking a look at these things, U.S. Fish and Wildlife, you talk about endangered species. I am on Colorado Counties Public Lands and Agriculture, Fish and Game Committee. We were given an example of four ranchers in West Texas that were asked by U.S. Fish and Wildlife to reintroduce a hawk that was on the endangered species list. They were told that their ranch would be wonderful habitat for this hawk. And they said okay fine, reintroduce the hawk. A year later U.S. Fish and Wildlife came to them and said, You can't ranch here anymore; you have an endangered hawk on your ranch. I am scared to death of the Federal Government.

Which "Urban Giant" are we taking about? We are talking about a Federal Government with a Bureau of Interior headed by Bruce Babbitt that absolutely wants to steal all the water -- forget Colorado -- of the entire United States, certainly the Western United States. Every bit of water that emanates from a national forest or BLM, crosses any federal ground, flows into any federal ground, they want control of. Colorado has to work together. We have to work together to fight not only all of the water going to Arizona and Southern California for free. We have to fight the Federal Government that is trying to take all our water. We can sit here and talk:

Durango doesn't have enough water, and Colorado Springs has too much; that sure is a real problem. What are we talking about for the long haul?

I think we have got to band together. I was at this conference about six or seven years ago and Ben Nighthorse Campbell spoke. I am a Republican, and he is a Democrat; however, he was the best speaker there. At any rate, at that time the registration sheet showed half were from California and Arizona. I looked and I saw only one Californian name on this registration sheet. This is telling me something: they are not worried because they have got it coming to them anyway.

I am going to shift gears a little bit. Douglas County is the fastest growing county, not only in Colorado, but percentage wise in the United States. We are located between Denver and Colorado Springs, a very fast-growing corridor. In 1981 Douglas County had 18,000 people; next year we will hit 100,000 people. That's quite an increase in a pretty short period of time.

Regarding the subject of "Quenching the Urban Giant," it's very simple for some to say stop growth: put a moratorium on building permits. Well, whether we like it or not, 15 years ago, the Commissioners zoned for enough houses to accommodate 500,000 people in our county. None of us want 500,000 people. We have enough underground water for 300 years. The only thing is, in 50 years or 100 years it will be economically unfeasible to recover it. Once you get out of the artesian head with a well you can't pump it any more, or you have got to use four wells to do what one used to do.

Yes, we have a water supply and we are looking at all those things. But this is what we have to deal with: when a property is zoned and that owner/developer comes to you and he has followed all the rules and all the guidelines of landuse, how do you legally deny him a right to develop his property? If you say he can't, you're not familiar with Lucas versus South Carolina. Two years ago, it cost two counties and the state of Minnesota $28 million based on a ruling by the United States Supreme Court. Lucas versus South Carolina says if an owner/developer has property properly zoned, if he goes through all of the rigmarole he has to go through, if he follows all the guidelines and you don't allow him to develop -- you just took his property and you buy it. I have to tell you Douglas County's annual budget is $30+ million; it can't afford $28 million worth of buying someone else's property.

So you talk about balance here. We try as aggressively as we can to downzone. There are many projects that we hope will never happen. We work on downzoning hopefully, voluntarily. The other side of the coin is to simply say, stop zoning. Don't issue building permits. This thinking does not deal with the real facts of life or else those folks have never heard of Lucas versus South Carolina. You know, I mainly don't want any growth by my house at all. But if it is zoned there's not much I can do about it. That's another problem we all face.

We in Douglas County have a water authority. We hosted a downlink from Washington, D.C. put on by the League of Women Voters, and it talked about our groundwater supplies -- it was in our conference room; we hosted it for the State of Colorado. The panelists were mostly from the East Coast, except one lady from Nebraska. They were all saying that we must not worry about water in the West because our water problems are exactly what they are in the East. And this is from somebody from South Carolina, where they get 50 inches of rainfall a year, and we get nine. The downlink lasted three hours and they had people from different parts of the country call in with their concerns about groundwater. Out of 55 phone calls, they took one call from Idaho; every other call was from east of the Mississippi. We have people that don't know anything about our water problems in the West that are making decisions about our water, and I have to tell you that it scares me to death.

We can talk about quenching the "Urban Giant;" however, we need to identify what that is. We need to work together in Colorado Counties, in the Colorado Municipal League, and all the organizations in the state to identify who we are fighting. It is easy to say the Front Range wants all our water. Yes, we are taking some of it; we aren't taking all of it. Two Forks went away regardless of whether you liked it or not. We've got groundwater. We are looking at a lot of arenas where we can supplement this water supply and do something with it. It is incumbent upon us all to identify who are we really fighting here: is it the Federal Government, Southern California, Arizona? Do we have a statewide vote? I think the Denver Water Board would love it if

we had a statewide vote and then we could take the water over there. We hear that about roads. I am on the transportation committee at Colorado Counties. Let's see -- one county one vote. That doesn't count; we need more roads. Eighty percent of the tax dollars come from the Front Range, so 80 percent of the road improvements should occur in the Front Range. We hear that all the time. I was one of a few Front Range Commissioners who said no.

As I said, my daughter lives in Gunnison so I come here a lot. We all have our little political pressure groups. That happens to be one of them.

When Jack was introduced they said he was a practicing politician, a chairman. I want you to know that all politicians practice. I don't want to tell you what. There are a lot of things we all deal with, and I think it is really important that we understand first. I had a boss years ago, a little bit of an Irishman, that spoke with a bit of a brogue, who said, "better the Devil you know than the devil you don't know." I maintain the devil we don't know is who we have got to combat here. To arbitrarily say, "stop growth by water zoning" doesn't solve the whole problem. Sure it's a part of the solution, but we need balance and we need everyone in the state of Colorado working together.

Q: (Unknown) I am a county commissioner. I would take exception to a great deal of what Mr. Holmes and Mr. Murray both had to say. To answer Jim's question about the "Urban Giant," southwest Colorado thinks it is Durango. I know where Jim comes from, because I hear him all the time. I don't want to know any more from Mr. Holmes right now. Regarding payment for degradation, I think that cheapens the value of rural lifestyles. It assumes that we can be bought off, and I can in no way support that. Jim very well addressed the issue about voting for something. That constantly happens to rural Colorado. We are voted out by Denver on issues of social services, you name it. It happens in the Legislature. We don't need our water decided that way. That assumes the choice will be made by those people who have no ownership interests in either the land or the water. I don't think that is appropriate. La Plata County currently has 4,000+ platted, undeveloped lots which have already been approved and several thousand in the process. We are being 35-acre ranchetted to death. There is no review process.

I think, as groundwater goes, that is our biggest problem right now. The State Legislature has refused to allow review of 35-acre parcels or less where we can at least provide review for water issues -- a greater level of review. There has been no concentrated effort regarding the contamination of ISDS individual sewage disposal systems and what happens there in those 35-acre parcels. We have an inadequate transportation system, substandard and inadequate sewer systems, and the assumption that Durango will expand their water system to accommodate the growth on the Florida Mesa, which I think is not going to happen. We don't have any ability to control it. There has not been enough discussion as to what the recharge rates are and how those water wells interact or fail to interact with irrigation and what that is going to mean to all of our aquifers there. On the groundwater downlink we tried for three days to presubmit a question there. Same thing. You cannot take your chances, and we followed it and got no information. We were told that we were insignificant. As to Mr. Murray's comments, Colorado homebuilders are the people who have consistently fought in the state against the supervision of 35-acre review. Here I find them saying that we need growth in the cities, and that is where it should be, and all of those resources should go there. My final question on that is to Mr. Murray, and he is not here to answer it, but who is going to feed those people if it is not rural Colorado?

A: (Jack Holmes) I want to respond that I don't think payment should ever be made to rural Colorado. I think what you end up doing is having that kind of a principle. You get the "Urban Giant" to think in other directions. And as far as a statewide vote goes, I don't think people in Denver are 10 to 1 in favor of water diversion. I think they are probably about 45-55 in favor of water diversion, and they are 100 percent against it over here, or 95 percent, and to me that adds to a defeat. I don't think Homestake II could pass any statewide vote unless I can't count votes, and maybe I can't. But if I can, I don't think it is going to pass. I think both of those are at least ideas worth discussing.

A: (Jim Sullivan) This may be. We didn't do a poll. All I am saying is, if I lived in Western Colorado I wouldn't want to take the chance. That is a crapshoot, and it is a crapshoot that I am a little nervous about. I didn't get into the EPA. Obviously, I am not a great EPA lover or of any federal government bureaucracy. Some counties trouble me, frankly. But here is one that gives you a lot of comfort, I think, with the EPA. EPA grants $500,000 to study cow belches -- half a million dollars. We are talking about water, the vital life's blood of what we are doing. The Wellhead Pollution Act -- we haven't even seen what it is yet.

At this water conference we had, there was a gentleman from the EPA and he had a book. He said, "I just got it." We had invited him to address our water authority to tell us what's in it. He said, "Well, if a guy has a well and he's polluting the aquifer, we are going to shut him down." I said, "What are we testing for here?" We have 53 water districts in our county. We find that some of the testing is required by EPA. We haven't had a copper mine in Douglas County ever, but we have to test for copper. When you get into some of these things, people need to pay for what water is worth. But how

much regulation is being placed upon water districts and water providers that throw so many things way out of whack. Again, I have to say that when I see that EPA gives $500,000 to Utah State University to do a bovine burp check, I just don't have a lot of confidence in what our federal government is doing.

Q: Why is it that Durango has such a high profile?

A: (Cap Allen) I would like to go back to something I alluded to in the first panel, which is the concept of an intrastate compact. I found each speaker stated a principle that would lend to that concept. Lynn Murray's comment was that the greatest portion of the remaining compact, unused compact water, should be allocated to the metro areas or municipalities. That is an allocation that a compact could deal with. Mr. Holmes, you suggested let the market forces deal, have some governmental agency involvement. I didn't get a statement from you but I made a comment that you would very much consider that concept. Mr. Sullivan, you indicated that we need balance and we need to pull together in the State of Colorado. In 1922 we had a group of states that got the idea that we better sit down and allocate this river before we start fighting over it. It may be too late in Colorado, but I think that is something we need to look at.

Let me throw out some clauses that we could put in. Obviously, an allocation clause would be the guts of an intrastate compact, where the Front Range -- Metro Denver, Colorado Springs, Pueblo, whomever -- would end up with a certain quantity of water forever out of the Colorado River system. That is all you would get, you plan on that, you do your conservation around that. You could conceivably have some pretty strong arguments against our downstream neighbors. We talked about the Jim Lochhead principle -- we'll loan you our water long enough to get you back down to your compact entitlement so you quit taking our water. That same concept of imposing conservation could come through an intrastate compact as against the Front Range communities. So, you have a conservation clause. You could have a basin-of-origin principle in there. You could deal with Indian water rights in that compact. You could deal with endangered species. In fact, I see an intrastate compact as a vehicle for asserting **very strong** state's rights as against federal agencies. While we can't throw them out the window, obviously, you could deal with federal reserve rights, wilderness water issues, election issue in an intrastate compact -- there are a lot of things you could deal with. I would like some comments on that.

(Jack Holmes) I think this is something that is worth discussing, and I think obviously we can't do this in an afternoon, but there definitely needs to be something going on in terms of allocation, conservation, endangered species and wilderness, and it is worth discussing. I don't want to comment on all the specifics, because I don't think we are at that point, but I think there is a need to address this kind of issue.

(Jim Sullivan) You heard me speak earlier of Colorado Counties. I am a strong supporter of that because there is really great interplay amongst the counties. I like to feel that there is great sympathy for problems in one county that perhaps we don't have that La Plata has, or someone has, and they may look at us and say, "You really have a problem with growth. How do you manage it?" So, the idea that we have a forum and can start some dialogue might be a form where at least the county commissioners can start talking. It is a pretty good cooperative group.

Q: (Unknown) From what I understand, a lot of the difficulty moving from the compact level down to the local water supply district situation level is that many small districts are having great difficulty financially coping with the request to annex to the district in order to get a supply of water. This isn't usually the 35-acre situation. It is probably the three to five-acre kind of housing projects. There is not only a quantity problem in terms of the wells not being able to supply the water. There is also a major cost problem in terms of upgrading the wells, upgrading treatment, or whatever is necessary that this large project on the boundaries of a small district would impose. I am wondering how one deals with that situation.

A: Is your question the financial problems that some districts might be having or what?

Q: The question is partly related to how you deal with the kinds of growth problems that this presents, not just to counties because often counties can approve, but it is without necessarily getting an agreement or working with the local water district. I think one of the things you mentioned was about 53 water districts within Douglas County. It is hard, perhaps, for the county to work with each of those when an annexation is proposed. But each one of those has growth on its borders that it has to deal with as a very small district.

A: (Jim Sullivan) Out of the 53 water districts there are two that had bankruptcy problems. They are coming out of it rather well. One of the answers to district problems, as they have financially found themselves in deep water (no pun intended), is growth. Amazingly enough, how do you retire debt if you have a financial problem and growth is the one thing -- water taps, sewer taps -- that gets you into trouble. It does deplete, and Steve Boand (whom I should have introduced) is also from Douglas County and on our Douglas County Water Advisory Board. He has been a strong spokesman for water in our county. He knows that this is something we deal with all the time -- to keep the districts out of trouble and to manage the growth so that we don't overrun ourselves.

What do we do? In fact, at the break Steve and I were talking about over by Chatfield Dam where a couple of areas have shallow wells. Steve mentioned that even some of those wells are going down into a deeper aquifer and they are going dry. Of course, there is a huge development just east of them, the Highlands Ranch development, and the first reaction of those people is, "My well is going dry because of Highlands Ranch." Highlands Ranch has 30,000 people in it, but that is not the case. What the county did was get out the State Engineer and say, "What is happening here? Why are these going down?" We found that not so much the urbanized development on the boundary was taking these down, but the 35-acre guy who has horses out there, and before the new water law those guys were irrigating dryland wheat and irrigating hay pastures. We found that the problem was coming more from agriculture than from the urban developments. So, I guess what counties can do when people are having problems with their wells is get the State Engineer and find out who is causing it. Is it Highlands Ranch? We want to help people, and basically the answer is they need to form a district and get a guaranteed water supply from Centennial, which is the Highlands Ranch water area. But there is a tremendous cost to that, too. There is no pat answer.

Front Range Water Supply Planning - Cooperative Solutions

Ken Salazar

Attorney
Parcel Mauro Hultin & Spaanstra, P.C.

The topic of this Nineteenth Annual Water Workshop is a timely and important one for Colorado and the arid west. Through this workshop, Western State College and Lucy High have again demonstrated their leadership in helping us understand the complex water resource issues of our time.

For those of us from rural and agricultural communities, it can be extremely disconcerting to know that the water rights historically used for agriculture and upon which the livelihood of rural communities depend, may be transferred to meet the higher valued economic uses of the cities. The American Water Development, Inc. project in the San Luis Valley, the Colorado Water Supply proposal in the Lower Arkansas River, and the Union Park Project on the Taylor River are only a few recent reminders that demonstrate the deep concern rural communities feel when water might be taken for the benefit of faraway urban populations.

For those of us from the growing urban areas, it can be equally disconcerting to know that the water supply we depend on is uncertain and may soon run out. Indeed, this is currently the case with communities in the southern Denver metropolitan area where Douglas and Arapaho Counties are among the fastest growing counties in the United States and where million dollar homes rely on the finite and unreplenishable water supply of the Denver Basin aquifers.

According to the state demographer, Colorado's Front Range cities will add more than a million new residents by the year 2020. Also, Colorado's river valley will add another quarter million people by the year 2020. Given this growth, Colorado's population could double to more than 7 million people in the next 50 years. As the population grows, we can be certain that the issue of water supply for urban communities will continue as an extremely important issue for all of Colorado.

We are fortunate that in Colorado the Front Range Water Forum and the technical committee working for the Forum are exploring new options to meet the needs of the growing urban giant in a manner that should lessen the divisiveness of the Colorado wars of the last several decades. Some of the opportunities being examined include conjunctive use of surface and groundwater, effluent management, interruptible supply arrangements, and system integration as potential solutions for the metropolitan water supply challenge. The lessons learned from that investigation should provide valuable information to other communities struggling for water supplies throughout Colorado and other states in the West. You will hear many speakers talking about the Forum over the next several days. Doug Robotham, the Special Assistant to the Executive Director of the Department of Natural Resources and the Governor on this matter, will also be available to update you on these efforts.

I would like to (1) present an overview of the history of how the State in partnership with local, private and non-profit interest launched the metropolitan water supply investigation; (2) summarily review the present targets of investigation of that effort; and (3) set forth some observations on solutions for quenching the thirst of the urban giants.

Retracing the History of the Metropolitan Water Supply Investigation

As many of you may recall, the State of Colorado had no involvement in Two Forks except for the Governor's comment to the U.S. Army Corp of Engineers on the Section 404 permit. Colorado law provided no role for the State of Colorado or for the Governor to speak on such matters. Instead, the Governor was invited to comment on the Two Forks permit as a "public interest" matter. Following the EPA veto of the Two Forks permit, Governor Romer in his State of the State Address in January, 1991, called for enhanced cooperation in the planning and development of future water supplies for the Denver metropolitan area. In the following years, the Department of Natural Resources has attempted to play a helpful role on this issue.

Following the Governor's State of the State Address, we met with the mayors and representatives from numerous communities including Thornton, Denver, Aurora, Westminster, Arvada, Northglenn, Littleton, Lakewood, the Northern Colorado Water Conservancy District, the Southeastern Colorado Water Conservancy District and the Colorado River Conservation District. At each meeting we discussed the possibility for cooperation and the need for further evaluation of cooperative approaches to deal with metropolitan water options in the post-Two Forks era.

As might be expected, the interests with little water had a great interest in the State of Colorado playing a major role in helping find solutions to the urban water needs. Conversely, entities with significant water indicated their apprehension about having any state involvement because of concerns that it might disrupt their current water supply planning and very significant investments they had committed to implementation of their plans. Nonetheless, we received a very cautionary green light in moving forward with our effort.

In the latter six months of 1991, we again communicated with many of the stakeholders about moving forward with preparing a document explaining the concept of cooperative integration of water supply systems and surveying other options for meeting the future water needs for the Denver metropolitan area. The Colorado Department of Local Affairs in late 1991 agreed to provide $10,000 for the funding of this study.

Additional impetus to move forward with the study occurred when on December 24, 1991, the Colorado Water Supply Company met with Governor Romer to brief him on its proposal to pump water from the Fort Lyon Canal and dry up 50,000 acres in the Lower Arkansas River Valley for meeting the demand of the metropolitan area. The Governor immediately voiced his concern and opposition to the proposal because of the tremendous social, environmental and economic impacts that would occur in the Lower Arkansas River Valley. The Governor asked us to continue our efforts with the stakeholders in the metropolitan area to help devise workable solutions that would avoid the social and economic dislocations and waste of resources involved in major litigation in these huge interbasin proposals.

In September 1992, the Colorado engineering firm of Hydrosphere delivered its report titled "Systems Integration as a Water Supply Source for the Denver Metropolitan Area." That report set forth a review of options for additional water supply. The six options included: (1) new major water supply development projects; (2) smaller new storage facilities; (3) conversion of agricultural water rights to municipal and industrial use; (4) improved water efficiency; (5) integration opportunities for existing storage and delivery systems; and (6) enhanced information based solutions.

We then wrestled with defining the next appropriate steps. We made a decision in late 1992 to hold a state water convention sponsored by the Governor, the Colorado Water Conservation Board and the State Engineer, local elected officials, numerous members of the legislature, and numerous water and environmental organizations. More than 600 people throughout the State of Colorado attended the Colorado Water Convention. Those in attendance sent a strong signal that (1) the State of Colorado could provide additional data and information on water resources, and (2) that enhanced cooperation on water resource issues was necessary.

On January 18, 1993, we asked the Colorado Water Conservation Board to request legislative authorization to spend up to $500,000 for an in-depth investigation of the following: (1) a cooperative arrangement between the agricultural water users under the Burlington, Farmers Reservoir and Irrigation Company and Henrylyn systems and the Denver metropolitan communities which would include the concepts of reuse, interruptible supplies, and the fallowing of marginal agricultural lands; (2) the integration of non-tributary groundwater with existing surface water rights into the overall metropolitan water supply systems; and (3) the potential for building additional capacity into the Carter Lake Pipeline of the Northern Water Conservancy District.

In our request to the Colorado Water Conservation Board I stated the following:

> I believe that such a targeted investigation would result in (1) enhanced water supplies for Front Range municipalities which would lessen the pressure on agricultural transfers of water to Front Range cities; (2) a relationship between agricultural water resources and metropolitan needs which could be supported

> by the agricultural community since it would enhance rural economies and preserve agriculture; and (3) an impetus for all of us to explore an institutional arrangement among the Front Range communities to pursue these solutions once the conclusions of the investigation are known.

I continued:

> I believe that the State of Colorado has a role on these issues because (1) we should help our growing cities in the State have a sufficient water supply to sustain our economies over decades to come, and water supply certainty is a major component of that future; (2) we should maintain the health of our major agricultural economy in Colorado and protect rural communities; and (3) we should assure the water supplies from the Front Range are secured in the manner that provides the best environmental alternative.

I concluded:

> I know that some argue strongly that you need first to put together the institutional arrangement to move forward on any solution to Front Range water supplies. While the institutional issues will have to be addressed at some point, I believe we should first target and investigate potential solutions and demonstrate how we can integrate current water systems and work with agriculture to enhance the water supply for the metropolitan area. Then, we can deal with putting together the institutional framework to develop, plan, finance and implement the solution for entities willing to participate.

The Colorado Water Conservation Board then requested the legislature for the authorization to spend up to $450,000 on the effort. House Bill 1273 signed into law on June 6, 1993 included the Colorado Water Conservation Board's request and specifically stated in Section 5:

> The Colorado Water Conservation Board is hereby authorized to undertake a regional study in cooperation with affected agencies of local government and other interest groups concerning options to increase the water supply of the Denver metropolitan area.

Following the legislative enactment of House Bill 1273, we prepared an Executive Order that went through numerous revisions, and was finally signed by Governor Romer on October 6, 1992 with the inauguration of the Front Range Water Forum.

The Executive Order called for the scoping and selection of targeted water supply opportunities and for a completion of the investigation within two years. The effort of the Front Range Water Forum Technical Advisory Committee has been underway since that time.

Current Status of the Metropolitan Water Investigation

The Front Range Water Forum appointed members to a Technical Advisory Committee which has invested a tremendous amount of energy since that time in lengthy meetings and informal negotiations on how to move forward with the investigation. The Technical Advisory Committee has agreed to focus the investigation on four areas which show potential for yielding additional water supply to the metropolitan Denver area. Those four areas are:

(1) Conjunctive use, defined as the coordinated use of surface and groundwater in order to use each resource more efficiently than could otherwise be obtained by separate and independent use.

(2 Effluent management, defined as the development of conceptual effluent management plans which focus on increasing regional metropolitan water supplies while complementing water quality compliance efforts.

(3) Interruptible supply agreements, defined as the potential for voluntary short term transfers of existing water supplies to meet municipal needs and increase the reliability of municipal systems without permanent reallocation of water use.

(4) Systems integration, defined as development of tools that will facilitate identification of opportunities to link existing water supply and distribution systems so as to increase or more fully utilize regional water supplies.

The members of the Front Range Water Forum and the Technical Advisory Committee have a tremendous about of work ahead of them. They are to be commended for their efforts. You will hear from some of them throughout the next several days.

Some Lessons From the State's Effort on Metropolitan Water Supply

A general ongoing concern has existed about the State's role in water supply planning. As previous stated, the State of Colorado has never played any role on these issues, nor did it play any role in the Two Forks permit, because the fundamental assumption has been made that private appropriators and not the State should be involved in appropriating water for beneficial use in Colorado.

Some concern has also been expressed that additional water may have to be imported from the West Slope and agriculture to sustain some of the options which result from the metropolitan water supply investigation. And many have indicated that the State may have an intention of making the metropolitan water supply investigation the beginning of a statewide water plan for Colorado.

While these are understandable concerns, in reality the metropolitan water supply investigation should lessen the pressure to move water from agriculture and from the West Slope to the metropolitan area. This should occur because cooperative approaches will result in efficiencies that squeeze more water out of the existing system.

Based on my work in this area over the last several years, I share the following observation with you on cooperative approaches to Front Range water supply planning.

First, the most viable solutions for quenching the thirst of the urban giant will be based on community based solutions involving all of the stakeholders -- local governments, environmental, West Slope and agricultural interests, and state agencies. Each of these interests can be part of a solution to the future metropolitan water needs. Conversely, the interests have the capability to stop any major water development project through the arsenal of legal avenues available to them.

Second, Denver's role must be understood and respected. Denver provides more than 60 percent of the water for the metropolitan area through a system envisioned and built by Denver citizens. The protection of what may be Denver's greatest physical asset is essential to the City's future, especially in light of the growth limitations imposed by the Poundstone Amendment and the current and future needs of Denver citizens. In this context, we must appreciate the leadership of Mayor Webb and the Denver Water Board in their public pronouncements that (1) Denver's water system will be allowed to work for the benefit of others, and (2) Denver is willing to assist in planning for development of water supplies for the entire Denver metropolitan area.

Third, for the suburban interests with water -- Aurora, Thornton, Arvada, Northglenn, Westminster and others -- the same can be said about them as for Denver. Many of the leaders of those communities, such as Mayor Carpenter and Mayor Tauer, have led their communities to make major investments based on certain assumptions about water supply planning. We must understand their desire to protect their investment, and given those investments, we must appreciate their willingness to participate in finding cooperative solutions beyond

their borders. For the suburban interests with little water and great need for water, they need the assistance of the rest of the State to provide water for their citizens and they must be willing to invest in finding adequate water supplies.

Fourth, agriculture can play a key role in providing water for urban communities through arrangements that can sustain rural economies with new revenue streams and at the same time enhance the reliability of metropolitan water supplies. Given that 90 percent of Colorado's water is consumed by agriculture, I believe we can achieve these objectives through innovative management and sharing water supplies between agriculture and urban needs.

Fifth, the West Slope has as much as a million acre-feet of water that could be developed. We can be sure that development will not occur in the future unless win-win solutions can be designed to protect the future economy and environment of the Western Slope. We have examples of how this is occurring in initiatives such as those at Clinton Gulch and the Eagle River.

And sixth, the State can play a role in helping resolve these issues. The State's role can be that of a convener and facilitator. The State can also lead in providing accurate data and information on water resource uses and needs. In addition, the State has financial resources to assist in water development. And finally, the State could use its political influence to secure the support of federal agencies. We are fortunate to have Jim Lochhead with his background and leadership to help in this endeavor.

In conclusion, the citizens of the urban giant want a dependable water supply at the least possible cost. The citizens of rural communities and from the basins of origin want to maintain healthy communities and maintain their future economic viability.

Neither the political leaders nor the citizens of Colorado want the massive waste of resources that can occur through litigation and the uncertainty of decisions from state or federal agencies. Therefore, our only choice is to find cooperative consensus solutions to dealing with the thirst of the urban giant.

The Metropolitan Water Supply Investigation

Comments by

Doug Robotham

Special Assistant to Jim Lochhead
Colorado Department of Natural Resources

I have to express my admiration for Ken Salazar and for what he has done in general, but more specifically for what he has done just now in terms of laying out the history of the Front Range Water Forum and the Metropolitan Water Supply investigation. Ken has laid it out in more detail and organization than I have yet seen. Having been back in Colorado now for nine months I've heard snippets of how this all came to be. Ken's speech is something that you should read and digest, because what it suggests to me is that while there has been a lot of handwringing regarding metro cooperation or the lack thereof there has also been a lot of activity. I don't think we should overlook that fact.

My role here is to try to identify where we are within the Metro Water Supply Investigation. Ken alluded to the fact that we have completed the scoping phase of the investigation. The technical advisory committee that I have been working with is comprised of knowledgeable and informed people from each of the Front Range Water Forum entities that have some expertise in the area of water supply planning. These individuals have taken the charge of the General Assembly, they have taken the general direction provided by the Governor, and they have breathed a significant amount of operational life into that general direction by identifying four focused areas where we are going to spend our time over the next several months looking in some detail. As Ken said these are:

(1) **Conjunctive use**, defined as the coordinated use of surface/groundwater so as to increase the efficiency of the use of both those supply sources over and above what otherwise might be achieved by using those sources separately or independently.

(2) **Effluent management**, defined for the purposes of the study as developing conceptual effluent management plans that focus on increasing regional metropolitan water supplies in a fashion that is complementary to the water quality compliance efforts of Denver Metro and other entities within the metropolitan area.

(3) **Interruptible supply arrangements**, defined again for the purposes of the investigation as looking at the potential for voluntary short-term transfers of existing water supplies to meet municipal needs and increase the reliability of municipal systems without permanent reallocation of water rights and water use.

(4) **Systems integration**, which is again for the purposes of this study defined as identifying and developing the tools that will allow us to conceptualize or visualize opportunities to link existing water supply systems so as to achieve some economies of scale and some efficiencies that are not now apparent. What we envision there as a first step is the development of some kind of systems information database. It is likely to take the form of a geographic information system where we identify, in a manipulatable environment, where the key components of the various metro systems in the surrounding agricultural areas lie. And from a spatial standpoint that is enhanced by utilization of GIS technologies we will really look at where those opportunities for integration lie.

Having given a little definition to what we are doing in systems integration, let me walk back up through the list. With regard to interruptible supply arrangements, we will be looking first at what this animal is and how it might function in a generic sense. We are explicitly not targeting any ditch or any region of the state, because there are some concerns that an interruptible supply arrangement is simply the nose of the camel under the tent that could lead to the kind of wholesale transfer of agricultural water to municipal needs that the Governor back in 1991, with the proposed Fort Lyon transfer, expressed so much concern about, and which Ken has just laid out. Basically this would allow us all to better understand what's involved with an interruptible

supply arrangement and then confront the question of whether, based on that understanding, we want to look at a particular system or hypothetical systems and devise and figure out how these interruptible supplies really might operate. Again, walking back through the list, effluent management is likely to focus on available uses of effluent within the metropolitan area, looking specifically at the exchange potential associated with effluent supplies, and I think that there is a number of interesting possibilities where downstream senior diverters might be able to meet their needs through treated effluent, and thereby avoid calling water past existing municipal diversion points.

Front Range Water Supply Planning - Cooperative Solutions

Marcia Hughes

Legal Counsel, Metropolitan Water Providers

One interesting factor I was talking with Ken Salazar about is that his family has been in Southern Colorado since the early 1800s, my family since the later 1800s, and we both come from the southern part of Colorado. I am from the Montrose/Telluride area and here we are up in the Denver metro area looking at this question of quenching the urban environment, the urban drinkers, the urban water thirst, etc... What does that mean and how will it fit together?

Hopefully, some of the respect that both of us have gained through many generations living down here and teaching us this perspective can help us as we work in the Metro area. I'm also the general counsel to the Metropolitan Water Providers, with which many of you are familiar. You have seen me here over the course of many years talking about Two Forks and other matters. I have the perspective of working on developing water on the East Slope for the Front Range and the perspective of coming from the West Slope.

I was sitting in the back of the room watching what is going on here and thinking, "I wonder how many people think denial is just a river in Egypt?" I think we are engaging in a lot of denial here, and this I can borrow from just having gone through school and getting another degree in psychology. What we perceive is what we get. That is, what we have in our minds is what happens. So what is in our minds right now?

It seems that what is in our minds is we have to fight each other, that we are really endangered with regard to each other, and that this is the way it has to be. It is the way it has been since we have been settling Colorado in many ways. However, a lot of successful settlement has happened, and it has happened through cooperation. I'm concerned that we are getting more and more into the habit of fighting each other instead of finding some cooperative answers. Several years ago I spoke here addressing the perspective that scarcity is essentially in our minds.

There is a limited amount of water available, but there is enough water in Colorado to meet our needs as long as we will find the way to do that, instead of just continuing with this addiction of fighting with each other. We seem to have fun finger pointing all the time. It's the County Commissioners' fault. It's the West Slope's fault. It's the Northern District's fault. It's the Southeast District's fault. It's always everybody else's fault. Well, we need to take responsibility to step forward in terms of what we are willing to do to help the cooperation happen. I think that is the difference.

Now, there is something really different in my perspective from the last time I spoke on the question of cooperation. I have a whole different degree of concern. I guess my mind is saying scarcity may happen. The reason for my perception is because of actions by the downstream states. The effort in Nevada, maybe even more than California at this point, is to buy up our water rights, to get some lease-hold right to it; maybe saying that we will get it back when we need it, and anybody who believes that can buy a bridge. We won't get it back. Just like we probably are not going to get the water back from California which they are using.

I am concerned. I think that we really are not doing what it takes to protect our future in Colorado. We need to do that collectively. We need to find out how to work together to protect our precious resource. We're not a solo state. We are part of the United States and part of the western states, so we need to cooperate with Nevada and California, but we are not paying attention. We are not using a heads-up approach to this. We have our heads in the sand, folks, and it is the sands of history. The history is, it was fun to fight with each other when we all felt powerful and macho, and we could fight. That seemed to work, and eventually we would find some coffee table or business table where people could work things out, talk things through and come up with some kind of answer, do one project and then go back to our traditional fighting. It was like a family feud. But the dynamics are changing.

We are a family. This is one of the closest knit groups of professionals anyone can find anywhere. I believe we really are friends with each other, but we are friends in a way of knowing how to fight with each

other. It is an enormous expense at this point that we are maintaining that old behavior. The downstream states are getting this water. It is not just the Front Range, which is thirsty and is reaching out for a lot of water, and that is an issue we need to balance with the rest of the state's needs. But by fighting each other, we are not getting any of the state's needs met.

We have to add to this what is happening with the Federal Government. Commissioner Sullivan did an excellent job raising many of those issues. The Forest Service has been saying it has a national agenda to be certain that it gets approximately 40 percent of Colorado's water rights. What we have heard is once it gets 40 it will want 60. Now, maybe that is only the water rights going through the forest, but where does most of our water originate? It's in the forests on the national land. These are big concerns, the federal agencies and the downstream states. Of course we need to cooperate with them; of course they have needs that should be respected; but we must take personal responsibility as fellow citizens in Colorado to figure out how to work together.

That's my message, and I am doing the best I can to provide it passionately, because I believe that we really are losing our future as we sit here quibbling with each other. It is a matter of saying, "Yes, yes, let's work together for state cooperation." In that sense I have a fairly radical perspective. Most people would never guess that I would say this, but I don't think we can possibly develop future water projects in Colorado without the state being the leader. That does mean that local governments are going to have to give up some autonomy. I do not think we can surmount the hurdles of all the challenges to development that happen unless we are doing so together. The form of government we have in Colorado for that level of cooperation is the state. We have to work cooperatively with the Legislature and the Governor's office if we are going to have water projects. Until we decide that we are going to be willing to give up some of that autonomy, my sense is we aren't going to have those projects, it is just not going to happen. Some people may throw some money at various projects and a little bit will happen, but not much.

Eventually, I suspect, we're going to get to a crisis. The heat that we are literally experiencing right now might be a message that "drought happens." It does, although I haven't ever seen a bumper sticker that said that. It does happen. How many people in this room have experienced drought personally? About a fifth of the room at the most. Most of us have not experienced it. Some of us have been taught by our ancestors that it has happened, or some of us were so young, like during the 1955 drought, that we don't personally remember it, but drought does happen. It is a part of the natural cycle of the environment. We are not planning for drought in Colorado right now. Those are very serious concerns. There's my soap box, and I'm willing to admit that I'm on a soap box. I believe that the endangered species are important for us to address, that the viability of the national forests are important for us to address, that the viability of Olathe, Colorado is important for us to address. We need to figure out how to get together with some very significant leadership and a new way to address our concerns. I think the idea that we do a few well-placed reservoirs for our future concerns is an excellent idea. In the last panel this was discussed to some degree. Now, how is that going to happen?

It's going to happen through a process called collaboration. Our title for this panel is about cooperation, and collaboration is a step far beyond cooperation. I haven't seen that discussed much in the water forums yet. It means that we all give up something in order to create something new. We're willing to work to together to create something new. Now, we are not getting water projects built in Colorado by and large. We are finding more effective, more conserving ways to use water. That is wonderful; we need to keep that up, but we have an influx of population and drought happens. What are we going to do about that? I think the answer is coming together with people and giving up some degree of our individual autonomy in order to have the answers we are looking for. Now, while I do believe so much in this, I think we have some big concerns.

I'm going to draw from my experience with Two Forks as a "lessons learned" kind of format. I suspect most of you have heard of Two Forks, but some of you may not have some of the background. In the very early 1980s, the Denver Water Board and about 46 metropolitan governments signed a contract to work together to develop an urban water supply. This was a radical, new approach. The past was filled with enormous fighting and lots of money spent in the power struggle. Here was a new way. We worked on that. I was the attorney for the suburbs, working with many people from Denver, some of whom are here today -- many environmentalists were involved, many people from the West Slope, etc. Governor Lamm took a leadership role in that, and part of the lesson learned is that he made a difference. He created the Metropolitan Water

Roundtable. It was under his leadership, with significant work from Jim Monaghan and Charlie Jordan, that we really did a lot of work to cooperate with each other. However, we ended up with the Governor recommending a permit for Two Forks, the Corps of Engineers being ready to issue the 404 permit for Two Forks, all of the county contracts being signed for Two Forks -- so everything at the local and state level was completely handled. Everything was handled at every federal agency, including regional EPA, yet headquarters EPA vetoed the project. I'm sure many of you have heard of that scenario; so what went wrong?

Some of us forgot how much money the local governments put into this process. A lot more than $40 million was spent, and essentially ten years of our time. In my view, we have come up with nothing except for lessons learned. It is a little hard to say that it was worth it to get the lessons at that expense, and it left a bitter taste in a lot a people's mouths. However, we also did have the experience that for a while, working together felt good, so maybe we can build on that. I'm not sure how many people in this room realize this, but Two Forks is not dead. We just heard Commissioner Sullivan say it was, but in fact that is not accurate. We are in Federal District Court. The EPA veto has been challenged. We are awaiting oral arguments, so at some point there will be a decision in Federal District Court on whether or not EPA's veto was lawful. If it was not lawful, the court will either order issuance of the permit or send us back to EPA and the Corps to work on what is the next best answer. If that happens, maybe there will be a chance for some of the collaboration that I am talking about. Clearly, our world has shifted a lot since that EPA veto -- our expectations, our thoughts, our perceptions. We're going to have to find a new way to respond to this if the court does say what EPA did was not lawful, and orders that we go back and resume our efforts.

One of the reasons we have trouble cooperating in the Denver Metropolitan area is we are put together, from a water development perspective, in a real hodge-podge. The suburbs have approximately half of the people in the State of Colorado, but they essentially have no representative even on the state Water Conservation Board. There is an excellent representative there from Boulder, and Boulder is an important place, yet most of the people of the state of Colorado are not even represented on that state board. You can see from the state perspective that the suburbs have never really gained a foothold. The same thing happens in the Metro area. The Denver Water Board serves over half of the people in the suburbs. They don't have a mandate to serve them. It is taxation without representation, because there is nobody sitting on the Denver Water Board who is charged with making decisions that relate to the integrity of the suburbs. Instead, it is the integrity of Denver. Their mandate is to focus on "How do we get the best profit possible to have the least cost in the City of Denver?" They are not operating in the best interest of the suburbs. Now we really have an anomaly, because Denver has shifted with the Two Forks veto to really pulling back enormously, which makes sense, because they don't have a mandate. However, they hold a lot of those undeveloped water rights. This scenario raises serious concern of things being out of balance. In my view, in the best of all worlds we would have something like a water conservation district for the Metro area that would make decisions for the whole area, so we would have taxation with representation, and we would reduce the petty infighting.

I think there are two reasons we don't have such a board: one is the fear in the Metro area, for the various cities and to a small degree the Water and Sanitation Districts, of giving up their own power. Does Aurora want to turn over its ability to grow, via having adequate water, to this Metro water agency? Does Thornton? Does Northglenn? Does Westminster? Do people want to make those changes? Does Centennial Water and Sanitation District, a major water and sanitation district, want to turn over its sense of control? Many of these entities have a sense of individual control and power which they feel they need to maintain, and that is in the way of learning how to cooperate. The other key aspect is that so many of you, or the districts you represent from the rest of Colorado, have a big fear that if the Metro area learned to cooperate, with 80 percent of the votes and 80 percent of the dollars, that it would be even harder to balance that thirsty urban giant. That is an understandable fear. It makes sense, but what should we do about it? Should we keep fighting each other? I invite you to give us some answers of the best ways to address this challenge.

West Slope-Front Range Cooperation: Can it Work?

Comments by

Richard L. Gustafson

Eagle River Assembly
Colorado River District

Let me tell you a fairy tale. Once upon a time, there was a kind and wise Chief who lived with his tribe in a land named "Color." He had three beautiful daughters. They were not only beautiful and pure, but vivacious, had bubbly personalities and had eyes as bright as clear pools. The chief was very proud of his young girls and he protected them from any and all dangers.

One day, the Chief learned that hoards of people were descending on the land of Color, from the east. They destroyed, pillaged, raped and consumed everything in their path. The Chief feared for his people, and he feared for his beautiful maidens.

"What magic can you perform to protect my daughters?", the Chief asked the tribe's Medicine Man.

"I can save your daughters and make them immortal," answered the Medicine Man. "They will always be bubbly, beautiful, pure and life-giving for everyone in our land. They will not be able to do so in their present form, but you will be with them as long as you live."

After much thought, the Chief replied, "Protect my daughters from the invasion at all costs and make them safe from being pillaged and raped forever."

The Medicine Man called upon his great magic and with a wave of the hand turned the maidens, Gunnison, Colorado and Arkansas, into three beautiful rivers, where they will always be safe, pure and never be abused.-----

I told you that this was a fairy tale.

The history of water in Colorado can best be summed up by Mark Twain when he said: "Whiskey is for drinking, water is for fighting over." We, in Colorado, are classic examples of that quote. Until a few years ago, all decisions about water were made almost exclusively on the Front Range -- its diversion, its use, its waste, and even decisions which affected the land from which it originated. They bought the water rights, diverted when they chose, allowed uncontrolled suburban expansion, and the West Slope was considered an impudent but ample resource.

Then three things happened. I will refer to them as "wake-up calls."

The first was the battle over 1041 land use regulations. After the Legislature passed "1041," Denver challenged, in court, Grand and Eagle Counties who adopted 1041 regulations. Denver lost in the Supreme Court. Wake-up call number one.

The second was the Homestake II application to Eagle County by Colorado Springs and Aurora. I was chairman of those hearings, which included over 180 hours of testimony. I listened to every word. It was extremely tedious. The result of the hearing process was a denial of the application and ultimately an appeal process to the Courts. The lower court's decision was questionable, at best, as it read more like a personal attack on the Commissioners than a decision about the issues. However, the decision was in favor of the applicants, reversing the denial of the permit to build the project. It was appealed. (Note: since the delivery of this speech, the Appellate Court has reversed the lower Court decision.) Wake-up call number two.

Then came Two Forks. We began to understand the power of the Federal Government in water decisions in Colorado. When Two Forks was denied, the Front Range had wake-up call number three.

At this point, I believe, a major change took place in the philosophy of the Front Range water providers. It reminds me of a story Abraham Lincoln used to tell: "Better give your path to the dog than be bitten by him in contesting the right. Even killing the dog will not cure the bite." Consequently, they began to look for new ways and new ideas about how to get their water needs met in Eastern Colorado.

During this time, the Northwest Council of Governments had created an organization known as the Q.Q. (Quality and Quantity) Committee. This was a West Slope water defense organization for the purpose of fighting indiscriminate transmountain diversions to the Front Range. An idea came out of that Committee to create a forum to discuss water issues on a much larger basis. The Headwaters Forum was the result. It was based on the premise that if people with opposing points of view could come together and share their knowledge and ideas, maybe some useful solutions about developing water would result which would be a win-win atmosphere for all. The idea was timely with the change in Front Range's philosophy. People from both sides of the Continental Divide came together and began to talk to each other. These people were mainly the technically oriented representatives of the various interests. A model was created by the Forum which would create a process to test ideas, identify needs from wants, and balance resources with needs for all interests. That model needed to be tested.

The Upper Eagle Valley Water and Sanitation District came to the Colorado River District with a request. "Can you help us to open up a dialogue with the Front Range Providers? Maybe we can solve our problems through conversation instead of litigation." The River District jumped at the opportunity and the Eagle River Assembly was born. There were some obstacles to overcome, however. We needed an organization which was not just technical in nature, but one which could talk about the political realities of water development as well. We wanted to involve decision makers and to open up opportunities to solutions, not to have just another unproductive "roundtable discussion."

The mayors of Colorado Springs, Aurora, Vail, Eagle, Gypsum, Minturn and Avon were invited, as were the chairpersons of the Denver Water Board and all other districts who had a real ownership interest in the water of the Eagle River. Each was asked to bring one expert to help with technical issues. The number of elected officials was limited in order to not violate the "sunshine" law, as the press was not invited. Attorneys for the interested parties were also excluded. It reminds me of the title of today's conference, "Quenching the Giant." I'm not sure that the giant to which we refer isn't the legal profession. Decision makers and technical assistants only were invited, excluding anyone who might interfere with the chance to reach a consensus, but not to work to a compromise. James Russell Lowell said: "Compromise makes a good umbrella, but a poor roof. It's a temporary expedient often used in party politics, and almost sure to be unwise in statesmanship." So, compromise was not our goal. We wanted win-win solutions, not lose-lose compromises.

Our primary goal was to develop a common technical understanding of the water supply and demand needs in the Eagle Basin and to explore alternatives to existing water supply proposals.

The very fact that we, on the Western Slope, could discuss those issues with people from the Front Range was a major breakthrough. Here we were, sitting across the table and actually talking. When you identify a common goal, it is much easier to make good decisions.

The next step was to set up Rules of Conduct. Here are some examples: (1) No one will relinquish any current legal position in any actions which have been filed. (2) There will be no attribution, no opportunity for discovery, no comments made at the Assembly that would be used for later brief material. We could talk freely, knowing our thoughts and comments were safe from each other and the press.

Next came the process under which we would work. We must identify the actual water needs. This was an educational experience. The Front Range folks found there were options other than the ones of their current focus. Technical developments had opened opportunities. The Denver Water Board identified that it was not clear about future needs of water from the Eagle Basin. One of the biggest surprises came when the water districts of the Upper Eagle River discovered that there was not sufficient water available for current levels of construction. These shortages had nothing to do with transmountain diversions. The problem becomes clearer when properly identified and understood. This may also be true for you folks in the Roaring Fork, San Miguel basins and other basins as well.

Our needs clarified, inventorying our resources was our next challenge. Where were the shortages? Who created the shortages? How can they be corrected? What options are available?

A matrix was developed which listed the available options and the costs and consequences of each. The matrix included all extremes and several options in between, from "no-action" to the Wolcott Reservoir (the highest dollar solution). The technical staffs eliminated those which were not feasible. Only workable options were included. The report was released to the press and the public without a selection of any particular option. It was important that the public fully understand the options and their costs without an attempt by us to lead them to any specific conclusion. We wanted them to go through the same thought processes we did and reach their own conclusions. It was important to realize the tradeoffs, the costs, and the impacts of such things as rafting, development, golf courses, snow making, clean drinking water, water in the stream, and many more to reach a workable conclusion. A draft copy of the report is now available. It will not be complete until public hearings are concluded and the public's input is included. It is the intent to study the public input for new ideas and overlooked solutions before making a final recommendation.

Identifying the public needs from the public wants is a complicated process. What people want and what they need are highly divergent. We all would like full rivers, clean water, exciting kayaking and beautiful golf courses. We also seem to want urban sprawl, development and growth, and the things that brings with it. We moved to this part of the country to be in a pristine place where we can appreciate the environment. Then we bring all of our "comforts" with us and contaminate the environment and create the exact situation we were running away from.

The last step, after the recommendation, is to support the recommendation. This may be the toughest of all. One thing is for sure: litigation produces a lose-lose situation, or at best, a win-lose one. Winners never learn and losers never forget. Let me show you what I mean by asking you to play a childish game with me. Pair off with your neighbor and place the palm of your hand up to the palm of his hand. Now that you are palm-to-palm, choose which of you will push. Now, the pusher - push. Did you notice that when you push people, they push back? Abraham Lincoln told a story about a farmer walking down a country lane with a pitchfork in his hand. A dog from a neighboring farm attacked him and the farmer killed the dog with his pitchfork. The angry owner of the dog ran out and shouted:

"Why did you kill my dog?"

"Why did your dog attack me?" was the reply.

"Why didn't you fend him off with the blunt end?" the angry owner yelled.

"Why didn't your dog attack me with his blunt end?" was the answer.

Maybe we need a few more blunt end attacks here in Colorado, when it comes to water.

This was taken from the Boston Globe:

Here lies the body of William Jay,
He died protecting his right-of-way.
He was right as he sped along,
But he's just as dead as if he were wrong.

We speed along to litigation and it's high cost, legislative maneuvering and its destruction of trust, all causing costly delays, increased taxes and inflationary development costs, and conflict positioning, which, at best produces at least one loser. The loser attempts to get even and we continue the spiral indefinitely.

Now, maybe, in the Eagle River Basin, we have a unique opportunity to cooperate. You will have to make your own judgments of the results at some time in the future as to our success. Certainly, the Rio Grande is fully used. The Blue River is fully used. The Arkansas and the Platte are certainly in trouble. The Dolores, San Juan and Yampa Rivers are too far away to solve immediate opportunities. The Gunnison may already be

overcommitted, and the Eagle River may be the only remaining opportunity for cooperation in the State of Colorado. That is a sad message. We live only one-hundred miles apart but it has taken over 50 years to get to the table, to paraphrase a quote I heard earlier at this conference.

Here is the problem. The pain is going to be severe for the State of Colorado. The ultimate cost will make Colorado the loser. We sit and we argue. We talk about plans for "our" water, while others use it. We risk the reopening of the Interstate Compact, but you don't need to be a brain surgeon to count the votes in Congress between Colorado and California. We stand to be the real losers. We need to find ways to change because our current methods aren't working. Edmund Burke said: "We must all obey the law of change; it is the most powerful law of nature." But Sol Olensky points out the realities of change: "Change means movement. Movement means friction. Friction means heat. Heat brings controversy, and the only place where there is no controversy or friction is in outer space or in a seminar on political action."

Let me conclude with a story.

There were two contractors. They were going to Canada to hunt elk. They flew on a commercial airline to the end of the line, and there found a bush pilot with a pontoon plane.

"Will you fly us to this lake?" they asked the pilot, showing him a map.

"That lake is too small; I can't land there," was the pilot's reply.

"That's funny," one contractor said. "Last year at this time we had a pilot with a plane just like yours, and he landed on that lake. We hunted there."

"If one bush pilot can do it, so can I -- load up your gear." They flew to the lake, and after a pass or two the pilot brought the plane in for a landing. There were several hundred yards of lake left over.

"You're right," he said. "You can land here. I'll pick you up in one week. See you next Friday," and he took off and flew away.

One week later, he returned to find the contractors standing on the beach, their gear beside them -- and two huge elk.

"You'll have to leave the elk behind," the pilot told the contractors. With all that weight, we'll never get off this lake."

"That's funny," said one of the contractors. "Last year at this time, the pilot had a plane just like yours. We haven't gained any weight, we had the same amount of gear and two elk about the same size, and he got off this lake."

The pilot thought for a minute, then said: "Okay, if one bush pilot can do it, I can do it. Load up."

And they loaded the gear into the plane, tied the elk to the pontoons, and waited for the evening cool air and a breeze to help them get the best lift, and off they went. As the plane bounced across the waves, the other shore was rapidly approaching. They got closer and closer. Just at the last minute, the plane gave a groan and lifted slowly into the air. They all gave a sigh of relief and began talking all at once. The pilot didn't notice that one pine tree was just a little taller than the rest, and the plane caught a pontoon on the tree, flipped over and crashed into the hill. Everyone remarkably survived the crash. After looking about, one contractor said:

"Where are we?" After shaking off the crash, his partner replied, "We're 100 feet further than we were last year at this time."

I tell you that story for one reason. The Eagle River Assembly is 100 feet further than it was last year at this time.

West Slope-Front Range Cooperation: Can it Work?

Comments by

Rick Hum

Summit County Commissioner
Headwaters Forum

When Lucy first asked me to speak this morning about West Slope-East Slope cooperation I thought I better do some research, so I went to my favorite research library, Tattered Cover. I started looking around, tried the Spiritual section, didn't find an answer, tried the Scientific section, didn't find an answer there, but between the History and Science section and the Geology section I happened upon the Native North American section and found a book of stories. I though I would share this one with you.

Koluscap and the Water Monster

Once there was a great drought.

The rain stopped falling and the earth became dry. Finally, the streams themselves stopped flowing. There was a village of people who lived by the side of a stream, and life now became very hard for them. They sent someone upstream to see why the stream had stopped. Before long, the man came back.

"There is a dam across the stream," he said. "It is holding back all of the water. There are guards on the dam. They say their Chief is keeping the water for himself."

"Go and beg him for the water," said the elders of the village. "Tell him we are dying without water to drink." So the messenger went back again. When he returned, he held a bark cup filled with mud.

This is all the water the chief will allow us to have," he said.

Now the people were very angry. They decided to fight.

They sent a party of warriors to destroy the dam, but as soon as the warriors came to the dam, a great monster rose out of the water. His mouth was big enough to swallow a moose. His belly was huge and yellow. He grabbed the warriors and crushed them in his long fingers, which were like the roots of cedar trees. Only one warrior escaped to come back to the people and tell them what had happened.

"We cannot fight a monster," the people said. They were not sure what to do. Then one of the old chiefs spoke. "We must pray to Gitchee Manitou," he said. "Perhaps he will pity us and send help." Then they burned tobacco and sent their prayers up to the Creator.

Their prayers were heard. Gitchee Manitou looked down and saw the people were in great trouble. He decided to take pity and help them and he called Koluscap. "Go and help the people," Gitchee Manitou said.

Koluscap then went down to the earth. He took the shape of a tall warrior, head and shoulders taller than any of the people. Half of his face was painted black and half was painted white. A great eagle perched on his right shoulder and by his side two wolves walked as his dogs, a black wolf and a white wolf. As soon as the people saw him they welcomed him. They thought surely he was someone sent by the Creator to help them.

"We cannot afford you anything to drink," they said. "All the water in the world is kept by the monster and his dam."

"Where is this monster?" Koluscap said, swinging his war club, which was made of the root of a birch tree.

"Up the dry stream bed," they said.

So Koluscap walked up the dry stream bed. As he walked he saw dried up and dead fish and turtles and other water animals. Soon he came to the dam, which stretched between two hills.

"I have come for water," he said to the guards on top of the dam.

"GIVE HIM NONE, GIVE HIM NONE!" said a big voice from the other side of the dam. So the guards did not give him water.

Again Koluscap asked and again the big voice answered. Four times he made his request, and on the fourth request Kaluscap was thrown a bark cup half-full of filthy water.

Then Kaluscap grew angry. He stomped his foot and the dam began to crack. He stomped his foot again and began to grow taller and taller. Now Koluscap was taller than the dam, taller even than the monster who sat in the deep water.

Koluscap's club was now bigger than a great pine tree. He struck the dam with his club and the dam burst open and the water flowed out.

Then he reached down and grabbed the water monster. It tried to fight back, but Koluscap was too powerful. With one giant hand Koluscap squeezed the water monster and its eyes bulged out and its back grew bent. He rubbed it with his other hand and it grew smaller and smaller.

"Now," Koluscap said, "no longer will you keep others from having water. Now you'll just be a bullfrog. But I will take pity on you and you can live in this water from now on." Then Koluscap threw the water monster back into the stream. To this day, even though he hides from everyone because Koluscap frightened him so much, you may still hear the bullfrog saying, "Give him none, Give him none!"

The water flowed past the village. Some of the people were so happy to see the water that they jumped into the stream. They dove so deep and stayed in so long that they became fish and water creatures themselves. They still live in that river today, sharing the water which no one person can own.

Introduction: from Native American Stories told by Joseph Bruchac, "Koluscap and the Water Monster, reprinted by permission of Fulcrum Publishing, Golden, Colorado

Has a New Era in Water Management Started?

There have been prophets that have spoken of a new area of cooperation in the Colorado Water World... There may be evidence that this era has begun.

In the past year, there have been some developments that seem to be early indications that cooperation may be occurring, and there are definite accomplishments as a result of those cooperative efforts.

Clinton Reservoir-Fraser River Agreements: The Climax Molybdenum company had constructed a reservoir in the Tenmile Drainage that was to be used for mining operations and drinking water supply. After the recent cutbacks, Climax determined the reservoir was no longer required for their operations. The water

rights of the reservoir were junior to Denver Water's rights in the basin, so firm yield was zero or minimal. Summit County worked with Denver Water to establish a firm yield sufficient to meet a number of municipal, irrigation, and snow-making needs in Summit County.

Chips Barry, director of Denver Water, was instrumental in these negotiations, insisting that there must be a way to accomplish what was needed in Summit County without impacting Denver Water's current yield. Months of discussion and negotiation led to agreements signed in August 1992. The agreements preserved Denver's current yield while providing new and better water supplies to all major Summit County water providers and users, and they led to solution of the Fraser River problems in Grand County.

Since the Fraser River Basin is in the location of the Moffat collection system diversions to the Front Range, the flows of the Fraser River have been a point of contention in the basin for many years. These negotiations also led to agreements that have paved the way for settlement of numerous Federal Court cases. One of these cases is the Substitution/Exchanges case that will allow the Colorado River Conservation District (River District) to start construction of Wolford Mountain Reservoir on Muddy Creek. Another was a set of consolidated cases involving the exchange of Green Mountain Reservoir water and the appropriation date these exchanges would carry.

Grand County receives water immediately by an agreement that has Denver bypassing water they have traditionally diverted out of the Fraser Basin by re-utilizing yield that had previously been utilized in Summit County prior to the acquisition of Clinton Reservoir.

These agreements included substantial efforts from many entities. At the local level they included the County Commissioners of Grand and Summit Counties; the towns of Breckenridge, Dillon, Fraser, Frisco, Granby, and Silverthorne; the East Grand Water and Sanitation District #1; and the Winter Park Water and Sanitation District. There was also strong participation from the ski resorts in Grand and Summit Counties: Breckenridge, Copper Mountain, Keystone, and Winter Park.

On a regional basis there was representation from the Middle Park Water Conservancy District, the River District, the Northern Colorado Water Conservancy District, Denver Water, and Colorado Springs. At a state level the Colorado Water Conservation Board (CWCB) provided funding through their construction fund with authorization by the state legislature, and the CWCB staff provided technical assistance in preserving and working with the established instream flow agreements. The State Engineer's Office provided assistance in the preparation of technical agreements that allowed exchanges anticipated in the transaction. The Attorney General's office was also needed in the development of the loan agreements with the CWCB.

The Federal Government's cooperation was needed to understand the impacts on operations as they relate to Green Mountain Reservoir which is run by the Bureau of Reclamation. Moreover, the Department of Justice supported negotiations by allowing continuance of the Federal Court Cases to find stipulated solutions instead of proceeding with lengthy and expensive court proceedings. As a result, a comprehensive settlement was achieved which allowed Clinton Reservoir to prior fill in relation to the Green Mountain Reservoir.

In all, over 85 people played a direct part in the negotiations and discussions that led to a consensus-based set of agreements. Approvals were required by 15 different boards, the State Engineer, the State Legislature, and the Bureau of Reclamation.

One of the largest side benefits of the negotiations of the Clinton-Fraser transaction is a better understanding of how all the diversion and storage facilities in Grand and Summit Counties work and how we can cooperate to maximize their potential for all our uses. We have established remarkably better communications with each other based on this shared knowledge. We hope the working relationships established will allow us to continue to work together to enhance and improve Colorado's water systems and supplies while preserving the natural values and beauty of our rivers and streams.

Colorado River Headwaters Forum: The Northwest Colorado Council of Governments (NWCCOG) has had responsibility for the development of a water quality management plan (208 plan) for Region 12 (Eagle, Grand, Jackson, Pitkin, Routt, and Summit Counties). The 208 plan is a requirement of the Clean Water Act to

assess and plan for improvements to water quality. Over the years the NWCCOG has presented revisions to its 208 plan to the Colorado Water Quality Control Commission (WQCC), and there has been substantial objection from a major number of major water diverters. Their concerns have to do with perceived problems that could arise as a result of policies which address water quality impacts from water development.

Prior to embarking on a new 208 plan that would be the subject of further objection, the NWCCOG decided to attempt to build an extended group of stakeholders in the region's waters to provide a larger perspective in the 208 planning effort and get buy-in prior to submission to the WQCC. Since the group of stakeholders was large and diverse, NWCCOG decide to hire a facilitator to get the process off to a positive start. A grant was obtained from the Department of Local Affairs, and Rita Schweitz and Associates were hired to facilitate the first meeting of the stakeholders as a "Search Conference." At this first meeting, 45 participants worked together to find shared themes regarding the current state of the world, the history of water quality, the unique views of each stakeholder group, and the ideal future of water quality in the region. By the end of the conference, all participants agreed upon the following mission statement:

> Region 12 water interests and those who impact them desire water management through a collaborative process and a structure based on shared data.

This group of stakeholders has now met in four large forums and has chosen the name of the Colorado River Headwaters Forum. The coordination of the logistics has been done through the WQQ (Water Quantity and Quality group) of NWCCOG. Rita Schweitz and Associates have continued to facilitate the meetings. A steering committee has been formed to provide guidance to the agendas of the Forum. Many of the stakeholders have agreed to work together in a number of different areas, called goal groups. These goals include:

- Develop a 208 water quality plan.
- Develop a shared database of water quality and quality data tied to geo-based data.
- Develop a better understanding of water diversions and water resources.
- Monitor state and federal legislation.
- Educate members and non-members.

The Colorado River Headwaters Forum is becoming self-supporting, handling logistics, administration, and facilitation of the forum meetings. The goal groups are working on varying parts of the agenda. A strategic planning model has been used by the goal groups that incorporates environmental scan, mission statements, and action plans. As progress is made by each goal group, the forum receives presentations at quarterly meetings. This has been designed to be a way for smaller groups to work on specific issues, while getting buy-in from all stakeholders with confirmation of the mission statements and action plans.

Colorado River Headwaters Forum members report that the distrustful, adversarial way of doing business has changed because the people involved in water management have established new relationships based on an understanding of shared interest and trust in each other. Problems remain, and some litigation will continue. Cooperation and collaboration, however, now have permanent function in water management in Region 12. The Colorado River Headwaters Forum provides a positive mechanism to address water management issues in the future.

Conclusion: These processes have a few common lessons. The search for common understanding instead of dwelling on differences can be very rewarding. Consensus can be reached with divergent interests if the right people are willing to invest the time and energy that agreement requires. The prophecies of a new era of cooperation in the water world will come true if we want them to. As Bart Simpson would say, "We need more water dudes and less water buffalos."

West Slope-Front Range Cooperation: Can it Work?

Comments by

Greg Trainor

Utility Manager, City of Grand Junction

In recent months water users in the Grand Valley have had the opportunity to meet with staff members and management of the Denver Water Department. I would like to comment on the results of those meetings here shortly.

Who I am and what I do is not necessarily as important as where I come from. The place I come from is Grand Junction, Colorado. Many of you know where Grand Junction is. Grand Junction is a community that is located on the Western Slope of Colorado at the confluence of the Gunnison and Colorado Rivers. It is a beautiful place, contrasted specifically by the presence and absence of water. Ironically, there is nothing that symbolizes the Grand Valley as much as the Grand Mesa. This basalt-capped plateau rises approximately a mile above the valley floor, and it is the source of most of the municipal water for the Grand Valley. This really symbolizes what the Grand Valley is. However, there is nothing that defines the Grand Valley as much, again, as the presence and absence of water. This fertile crescent, as I like to call it, is defined by the canal systems that provide water to the Grand Valley. The most senior decrees in the Colorado mainstream provide water to this area: the Grand Valley Irrigation Company decrees date back to the early 1880s; the Palisade Irrigation District, 1889; the Orchard Mesa Irrigation District, 1889; the Mesa County Irrigation District, 1903; Grand Valley Water Users Association, 1903; and there are other water providers in the valley with water rights just as old.

As I stood on the Grand Mesa to take a picture, I thought about what values are embodied in this place I call home. Commissioner Hum talked about values and the importance of understanding values. I thought one of the things that I might try to do today was to reemphasize the idea of values. The values embodied in the Grand Valley are assuredly different than values that you may hold. As I looked down, I thought about the value of water and its aesthetic. Water is important to the Grand Valley not only for its irrigation, but also for the fact that it is there -- that it runs through the Grand Valley. It is something we can look at; something we can play in; and sustainability of life in a desert environment, artificial though it is. Th Grand Valley is sustained by this water. Long- term agricultural production is a value we hold dear in the Grand Valley. Whether you are a farmer or whether you are a person that enjoys being out in the country, agricultural production is an important value for us, as is local control of local institutions, particularly the irrigation companies. Water quality is important, and compensatory storage is another value that has developed over the years as a result of the things that have happened upstream from the Grand Valley.

But, today there is contention over the water that is delivered to the Grand Valley, that is distributed and managed in the valley. That contention is affecting the values that we hold important. Why is there contention? There is contention because of the seniority of the decrees that come to the Grand Valley, the amounts of water that are drawn out of upstream reservoirs in the late summer. The calls that are placed upon junior diverters upstream of the Grand Valley create contention. Growth of upstream ski and recreational industries create a problem. Endangered fish issues in the Gunnison and Colorado Rivers at Grand Junction also add to the mix. The involvement of federal agencies in the Grand Valley, that are looking to redefine or to find their new role in the West, has created some of the contention. Finally and most importantly, there is the inability of existing institutions both within the valley and without the valley to fashion suitable means and methods to understand conflicts and to find ways to deal with these conflicts and values.

A number of applications that have occurred in recent years have also added to the contention. These are a fact of life, and I understand that. There are proposals for substitutions of water that erode, in my option, the purposes and protection that Green Mountain Reservoir provides to the Grand Valley, substitutions that attempt to replace high-quality mountain water from the Blue River Basin with lesser quality waters from Muddy Creek and possibly Alkali Creek in the future. The Orchard Mesa check situation (Eric Hune of the Colorado Water Conservation Board called us a black hole) brings into conflict values between local control of local

irrigation districts and values of upstream junior diverters attempting to reduce releases out of Green Mountain Reservoir so that they are held whole. The Grand Valley Water Management Study brings into focus the issue of endangered fish to the Grand Valley as well as saved and salvaged water. The Roan Creek proposal also brings up conflicting values that directly impact the valley -- the uses of Gunnison River water and the ability of the Bureau of Reclamation to meet objectives of senior and junior diverters upstream and downstream as well as the fish.

Today, I don't feel that we have complete cooperation in the sense that I define it -- as developing substantial agreement and courses of action. We have water courts supervising negotiations of settlement. We have discussions taking place, many times or most times after technical solutions have already been determined and arrived at, and people and opposing interests have become engaged in their own preferred alternatives. We have outside interests imposing their wills without understanding local values, and most assuredly we have local interests opposing their values and will not only among themselves, but also with people outside the valley.

There are other ways to understand conflicting values -- I find some hope in the discussions that were presented this morning concerning the Headwaters Forum and the Eagle River Assembly. It appears that these two forums are doing two things that I think are important and essential to long-term cooperation. Number one is identifying who the affected interests are and trying to understand the value systems of these interests -- the likes, dislikes, hopes, dreams, hates, and prejudices -- each of these is a value to bring to the table. We know that people will lobby hardest for the those things that they value the most. It is extremely important that we understand what those value systems are. If an organization does not understand those value systems it will be virtually impossible to be responsive to those values.

Today and yesterday there was comment, discussion and illustration of five different kinds of things that are going on throughout the state. We heard about the Metropolitan Water Roundtable (which was a 1980s effort), the Upper Arkansas Watershed Forum, the Headwaters Forum, the Eagle River Assembly, and the Front Range Water Forum. But these various forums, in my mind, are made up of institutions. For these forums to work, institutions will have to develop an ethic and responsibility among themselves, as organizations, to search out and deal with conflicting values or to determine what values there are in the identified interests that they are dealing with.

As I mentioned earlier, some months ago we had a meeting with members of the Denver Water Department. I don't know whether any of you had the opportunity to look at it, but I think that yesterday, sitting on everyone's chair, was a copy of this significant document. It is titled, "Denver Water's Long-Range Planning Process." I think that this document is significant. I think this document is important. Commissioner Hum mentioned the new head of the Denver Water Department not only articulating verbally a change in attitude, a change in ethic, hopefully a change in responsibility concerning the approach the Denver Water Department wants to take in their dealings, but the Denver Water Department has also taken it one step further and put in writing this change of ethic. They have described in this document, and if you haven't had a chance to read it you ought to, assumptions past and assumptions future. If there is one message that I could give you this morning, it is that I would like each and every one of you to take one of your most difficult problems with some of the most intractable people that you deal with, and sit down and look at your assumptions past and look at your assumptions future and take a risk. Write down how you would approach this idea of cooperation, and put it in writing so that people can see it.

West Slope-Front Range Cooperation: Can it Work?

Comments by

Doug Kemper

Manager, Water Resources
City of Aurora

With today's complex maze of federal, state, and local regulations, it can get pretty depressing in the water supply business. Over $40 million was spent on an Environmental Impact Statement on Two Forks with no positive result. Millions have been spent on water rights litigation in pursuit of transbasin projects and again little achieved. It is difficult sometimes to know which direction to take and how to gain certainty in developing new water supplies.

There was a recent article in the Denver Post that discussed how Americans have become increasingly enamored with magic as a solution to the complex problems that we face today. There is an avalanche of data. Complex webs of interrelationships that are difficult to understand.

Wouldn't it be great to conjure up some supernatural powers and . . . Presto! . . . have your will carried out instantly? Maybe we could cast a magic spell over the EPA. Or hand the Forest Service an enchanted rose; command them to learn to love one another and earn their love in return; or remain a beast forever.

Where does it end? Well, let's start at the beginning. For Aurora, the beginning was 1891. The city was originally incorporated as the town of Fletcher after the Presbyterian minister and real estate developer that first platted the town.

Shortly after incorporation, Fletcher, the minister, sold his East Denver Water Company to the town. The company was purchased for $150,000 that was financed through a sale of bonds. There weren't very many people in Aurora at that time, so it was a pretty significant financial commitment.

The town now had a secure, independent water supply on hand and could focus on the future, which looked promising. The region was becoming prosperous. The economy was strong. Mining was creating new fortunes. Optimism ran high. This lasted for two years.

In 1893, the bottom dropped out of the silver market and real estate values plummeted. Fortunes were lost instantly. Due to financial hardships, the town was unable to make its bond payments. After ten years of lawsuits that followed, the town ended up owing $400,000 on the original $150,000 debt. That debt was not retired until 1955, which is almost 65 years after it was originally incurred.

Well, that wasn't all. The wells that the water company had dug for the town went dry during the summer of 1894, leaving the town without water for several days. In 1896, the town board implemented the first outdoor watering restrictions and water conservation became a major issue. In fact, the Town Marshall also doubled as the Water Commissioner and apparently the first one developed quite a reputation for terrifying water wasters.

Aurora, initially because of short water supplies, began buying water from the Denver Union Water Company, which was the successor of the predecessor to Denver Water. The town first started buying water for fire protection and then became entirely dependent upon the company for water supply.

As time went by, the City of Denver would effectively control Aurora's growth, and Aurorans soon found that their interests and those of Denver were often disparate. Denver controlled when and where Aurora would allocate new taps; in short, it controlled Aurora's growth. This was not popular with Aurorans at the time and they complained bitterly, but to no avail.

This same scenario was replayed through many other metro-area suburbs. Eventually, Aurora resolved to create its own independent water supply and began doing so in 1955. Today it is completely independent of

Denver, although there is some sharing of common facilities. However, the institutional memories of the conflict over water as well as many other issues remain.

Essentially, all of Aurora's initial water development efforts were successful, in that they delivered a reliable water supply. However, the city's approach to water supply development was radically altered after a rather difficult trail of hearings and rulings -- Two Forks, Homestake II, and the Collegiate Range -- after which the city's water supply policies were fundamentally changed.

The planning horizon was shortened from ultimate build-out, and is now approached as a 30-year planning window wherein the goal is to develop 10,000 acre-feet of new supplies per decade. Resources cannot be efficiently expended attempting to meet all of the needs at once. This 30-year planning horizon is divided into a near term ten-year period, and a longer term twenty-year period.

The current focus is on the most recent transfers in the lower Arkansas Valley, and restoration of the prairie. Completion is near on one of the largest revegetation projects in the west. It has been, to date, a seven-year project. Over 23 square miles have been seeded back to prairie. A program for responsible long-term management of the land is presently underway.

When these transfers are completed, Aurora will be able to serve an additional 70,000, plus population. The city's current population is approximately 240,000. From here, the entire focus of the near-term program is on maximum development of local supplies. That will consist of local groundwater, effluent reuse, and lawn return flows. There may be some small additional agricultural transfers. This will be our primary focus, though, for the next decade.

As the city's growth continues, which is currently forecast at just under two percent, new sources of supply will be required. The Western Slope will continue to be an area of interest. But the historic approach clearly will not work.

Old wounds must heal and new understanding must be gained on how the rivers work, what the local needs are and where the limitations are. Cooperative exploration of these issues is the approach that makes sense. The window of time is there now and the immediate pressure is off.

To be sure, there will always be reasons not to compromise, not to participate in consensus efforts, and when an agreement is not possible. Sometimes when we take positions, defend them, we become committed to them. The more we try to convince the other side of the possibility of changing our position the more difficult it becomes to do so. We become locked into a situation where it is difficult to even acknowledge, must less really understand, the legitimate needs of the other side.

As more attention is paid to positions, less attention is devoted to meeting the underlying concerns of the parties. The ultimate resolution of a conflict, whether through the courts or through concession, is likely to leave at least one side feeling resentful. The memory of that event can last for a very long time, which can impede agreements on issues that may arise in the future.

In the book Getting to Yes, the authors define a wise agreement as one which meets the legitimate interests of each side to the extent possible, resolves conflicting interests fairly, is durable, and takes community interests into account. They also conclude that the process of reaching agreement should improve or at least not damage the relationship between the parties.

Preservation of the relationships is the most important thing. It is the foundation of future agreements -- agreements to protect our existing supplies, to develop new supplies, and finding creative methods of resolving competing interests.

Cooperative agreements occur when they are in the mutual interests of the parties to do so. They are built upon common understanding of the interrelationship between supply systems and the human interrelationships. We have not had them imposed upon us. They were not the product of a consultant's study, an executive order, or court decree.

Whether through the Eagle River Assembly, the Colorado River Headwater Forum or the Front Range Forum, what the work really is about is healing past wounds and building new relationships. This can be a time-consuming process. Sometimes progress is just not visible, and sometimes it is amazing how fast things are changing.

We are not trying to convince each other about what nice people we are, lulling the other side to sleep while we raid their water in the dark of night. We are focusing on the substantive issues and expressing our ideas. In the Eagle River Assembly discussions, Western Slope interests have asked for some cap on future transmountain diversions and for relief from the continual threat of Front Range exports. Can certain optimum flow levels be targeted? Can certain minimum flows be guaranteed?

Objective evaluation of the facts has shown that many flow problems occur late in the year when transmountain projects are not diverting flows. Further analysis showed that additional water supply storage also may be used to enhance seasonal habitat needs. But where does the balance lie between human and environmental needs?

The best approach is to evaluate the needs of the source basin first. Study the fundamentals: stream hydrology, biology, ecology, the human needs, to find what is optimal for the basin. This is a locally driven process with stakeholders that includes the Front Range cities. A lot of work in this process is not very glamorous: data collection, statistical analysis, report preparation and review, and long discussions on future needs. There is no magic solution that will provide satisfactory answers.

Paul Cort at CU is currently preparing a book on the history of water management with a focus on future movements to organize around watersheds. So far, he has found over 20 of these efforts in Colorado alone and well over 100 in the West. The momentum is clearly swinging toward dealing with issues based on watersheds. But how to do it? The watershed protection approach that is being used by many of these initiatives was developed by EPA and had three major cornerstones.

(1) **Problem identification** -- identifying the primary threats to human and ecosystem health within the watershed.

(2) **Stakeholder involvement** -- involving those most likely to be concerned or most able to take action.

(3) **Integrated actions** -- taking corrective action in a comprehensive, integrated manner once solutions are determined, evaluating success, and refining actions as necessary.

If this approach is to be successful, it must be based on solid science. Many water suppliers have long complained that the federal government makes little attempt to understand how our streams in the West really function, that we get stuck with policies that get written by some bureaucrat who hasn't been outside the Washington, D.C. beltway. Hope is there that future decisions will be based on solid science and not manuals and policies.

We will never have all the information available to do this in an ideal manner. As I see it, it means trying different things to see what works. Define the problem, try solutions, discard what doesn't work, and solidify what does in the form of longer-term agreements.

There's a fantastic amount of infrastructure with the capability of linking our water supply systems. More needs to be built. Dick Bratton a while back had a larger vision of all the basins being interconnected, where water could be readily moved from point to point. We can do this, but it means having relationships, human relationships, in place that work.

There is much that we don't know. Data gaps are large and filling them is expensive. Being able to predict how components of an ecosystem interact is still primitive at best. But must we have all the answers before we do anything?

There is great flexibility in the statutes to allow us to try different water supply options right now. Aurora and other water suppliers do this at present, much more so than many may realize. We make temporary agreements for loans or trades, all within the boundaries of the appropriation doctrine, filling each others' needs as they occur.

But we may just now be scratching the surface. Cooperative forums allow the opportunity to learn a good deal more about each other's systems as well as watershed-based needs. It won't solve all our problems, but it is interesting work.

I think this is a fascinating time in the water field, perhaps the most fascinating in history. We are on the steep portion of the learning curve, and how well we make progress depends on how well we work together.

Our problems will not be solved by discarding the appropriation doctrine. It is not the fault of Democrats or Republicans, it is not left versus right, environmentalists versus water buffalos. We must get beyond the standard labels and focus on the interests, the mutual interests. There is no one study or report that will solve our problems.

The solution lies in increasing the scientific approach to understanding the river systems: working with the fundamentals, collecting data, looking at the problem areas, identifying possible solutions, trying them, and collecting more data.

The infrastructure is there to begin the process; there is no need to wait. The large number of cooperative, watershed-based initiatives offers an alternative to the courts for resolution of conflict. This does not mean that conflict will disappear; in fact, it may actually increase as many more interests are together working on the substantive issues.

Considerable uncertainty remains as to how well we will be able to meet future needs. We need less risk in maintaining existing water supplies and developing new ones. What we lose in certainty we must replace with flexibility, and this will serve us all well.

Questions and Answers

Richard Gustafson, Rick Hum, Greg Trainor and Doug Kemper

Q: (Jack Holmes) You are talking about all of the players getting involved early, and it seems like the way the Eagle River Assembly is set up you are excluding the environmental community and also the federal government. Maybe by choice they are not involved. If you are going to really get all the players together, you have the environmental community and the federal government that should also get involved in there, and I would like the person from Aurora to comment on that as well.

A: (Richard Gustafson) That is a good question, because one of the things we started out with the Assembly was trying to get all the stakeholders together, in other words the people who owned the water rights or at least the major water rights, because without them in conversation with each other, the rest was academic. The other part that is critical is the fact that each one of them had the resources to bring a technician in and that would give us some basic information. The first step of the Eagle River Assembly was to separate fact from fiction. There is a lot of myth running around as to what is possible and what is not possible. Just the very fact that Eagle County found out that it's part of the problem -- what was it Pogo said, "We have met the enemy and they are us" -- we found out that we are part of the problem, not necessarily part of the solution.

Consequently, we had to get over that hurdle first. Since we got over that hurdle, it is going to be opened up to everybody to have an opportunity to comment. I think one of the important issues that is really critical with this is that people understand that this is not a group of people who believe they have all the answers. It is a group of people who have come up with some creative solutions, but by opening it up to the public we hope to get some more creative solutions. If they are better than the ones we have come up with, believe me we are going to be very interested in them and pursue them. The environmental community will be very active in this process, I assume. I would be disappointed if they weren't. The public will be active in it, and I have never known the federal government not to get its fingers in someplace.

A: (Doug Kemper) I think Dick did a pretty good job. The point that is being made is that this is not going to all of a sudden end with just one limited group of people getting involved in it and then pushing something through. The annual report that the EPA did on their watershed initiatives reported on about 15 of them and lessons that have been learned, and one of the lessons that has been learned is that before you start into the process involving a larger number of parties, it is really helpful to have the issues focused first. Otherwise, things tend to wander all over the place. I think that is what we are trying to do right now -- gather the data and focus the issues, and at that point open it up to the next step. This is a long-term process.

Q: (Unknown) When do you and when do you not use the "Hell, no" negotiating tool and why do politicians seem to like it so well?

A: (Rick Hum) My answer to the last part first is that it works. If your community is of a nature that they want to keep things in the status quo (which they usually are) and you don't have diversions affecting your community, the concept of "not one drop" works very well from a political point of view. It is understandable; it is straightforward; it is easy. I think that leads to the first part, which is when can you use it? You can use it when you have opportunities to deliver on that statement. If you say, "Hell, no," when the legal side, the historic side, the political side is working against you, there are diversions in place, there is ability to continue to divert water out of your community, there is legal precedent for it, there are conditional rights that are happening, you'd be pretty stupid to take that stance because you are not going to be able to deliver on it.

A: (Unknown) Just one comment. "Hell, no" always gets a headline.

(Unknown) We have talked on a very broad scope at this session, but in addition to broad scope matters, there are things happening, in fact, on the ground with the technical people that are fun to watch. Orlyn Bell is the Division Engineer for Division V. Most of you know him. This year, we, Division V, did an interesting thing. Orlyn saw a window of opportunity where some water could be traded between the East Slope and the West Slope on the Fry-Ark project. He didn't try to gather hundreds of people together and make a decision. He had a very short time frame. He called into his office representatives of the primary players including the Bureau of Reclamation, and told them he saw an opportunity to send a few thousand acre-feet of water through the Fry-Ark system to the Arkansas. He said, "I see a system for us getting back a few thousand acre-feet if we cooperate on this thing and nobody makes a fuss over it." They did it -- 6,000 acre-feet got transferred over into the Arkansas that would not have been transferred otherwise, and the West Slope will get back 1200 acre-feet. In addition to the things that are happening on a global basis in these cooperative efforts, we have people on a regular basis who are trying to cooperate and to bring some of these things to fruition. What they do that is really helpful, it seems to me, is they give credence to the top-level cooperative discussions by in fact doing things that work.

(Doug Kemper) I think it is appropriate to try different things.

Q: (Butch Clark, Moderator) Today and yesterday we have been talking a lot about processes for solving these conflicts. I was wondering if the panel has some thoughts about applying these processes to what is going downstream -- Las Vegas, the lower basin considerations. We have a tendency to talk about the need for working out our problems within Colorado, but can some of these processes be applied for dealing creatively with the needs of the lower basin and our relationships with them?

A: (Greg Trainor) I definitely think it is important that all affected interests be involved before technical solutions are arrived at. I don't think there is anything better for democracy than more democracy. I think it is important to identify your interests and particularly those who might use their veto power to stop you. Those people who would use their veto power are those people who feel that they have been wronged or somehow that the process has been unfair. I know it can be messy, but I think it is important that those interests be brought in and are part of the process somehow.

A: (Doug Kemper) I tend to agree with Jim Lochhead's position on that, that the lower basin needs to be focused on solving its own problems. At this point, in terms of the direct impact on Aurora's water supply, I am not sure that there is an immediate one. Obviously, there is a potential out there with California's current population, around 23 million, and I think it is forecast to grow about 11 million to 34 million in the next 20 years or 25 years. It is tremendous, the number of people that are moving down there. I think there are times when perhaps it may make sense for us to stand up and fundamentally say that the compacts are something that we are not going to compromise on, and that we have our interests here and that is to maintain our way of life here as well. I don't see any need to back off on that.

(Butch Clark, Moderator) Greg, I would like to comment on that. Whenever you get into a discussion with someone trying to resolve a conflict, there is a risk. The risk is, if you are going in with bad intentions on your side, there is a pretty good chance that there is going to be a winner and a loser. Some of the things that Greg talked about this morning, I think, are really critical. We <u>all</u> have needs that we are trying to satisfy. Those are pretty basic -- survival, variety, self-esteem and love -- and those probably summarize the four basic needs. Out of those needs come values. Those are the values Greg was talking about. When we get to the point of discussing values, that dictates what kind of rules we set up and what our behavior is. If you ever want to talk to anyone and resolve a conflict, you can't resolve it by discussing their behavior. It doesn't do any good. You have to go back and look at what rules they have set up and basically what they are looking for. In the case of Grand Junction, for instance, they are talking about survival. They are also talking about variety and self-esteem, probably less on love in that particular instance than others, but it may be an influence in there someplace. But if you want to get into a negotiation across the table from someone, the "Hell, no" answer may be appropriate, but only if you are willing to take what their answer is on the other side. Don't ever go to the negotiating table unless you are willing to listen.

(Rick Hum) Butch, I think you bring up a very good point. The "Hell, no" answer in this case scares me. I don't think it is smart for Colorado to say the lower basin states have to find their own solutions to their problems. I believe in that as a value, but I don't think that is the position we should take from negotiation. I think if we do, the solution is ultimately going to be to change the compact. The lower basin states have a hell of a lot more political clout than we do in Washington, and that is where the solution will come from if we don't get involved and actively look for a solution for their needs and our needs and protect them. I think the concept of negotiation, collaboration and a negotiated type of agreement is much wiser than saying, "You go find your solution," because I don't think we will like their solution. I hope that Colorado will be wiser than that in the future and will get actively involved in working toward solutions.

Q: (Bob Gandy) I am an attorney in a couple of states, one of which is California, one of which is Colorado, where I have recently moved. I don't know that it is necessary to negotiate or cooperate with lower basin interests, but my point is that you damned sure better know what they are. You have to get inside the heads of the people who are sitting on the opposite sides of your fence or you are never going to understand them. You are never going to be able to construct your own defenses in order to keep them from grabbing what you've got. I am not saying that you need to cooperate with them, like you might be concerned with, but I am saying you better really understand what their problems are.

Q: (Unknown) Do you have a suggestion as to how we get in the heads of people in the lower basin states?

A: If you give me a few minutes I might think of one, but right now I can't.

Q: (Lucy High) I wonder if the panelists could comment on whether you see a need for changes in institutional structures and a change in water laws to help support cooperative efforts like you have been involved in ...(inaudible)

A: (Rick Hum) I think we are seeing that some of the institutions that we have today are not adequate to serve the needs of the future, and that is why organizations like the Headwaters Forum are beginning to evolve that don't just protect regional interests but involve all the stakeholders. I think that new institutions are starting to form and that more of that will come in the future as we move to watershed planning as Doug alluded to. In terms of state law, I think that there is a good balance today in terms of state law. I don't think that we need to go to a pure democracy to settle basin of origin issues and have initiative processes. I think that is not the right way to go. I think representative government is working better where you have people that can work from a position of informed consent, that understand the issues and can work toward solutions.

I think 1041, balanced with prior appropriation, is a good balance, that it has created a fair playing field for all of us to work from. I hope that we quit squabbling in the Legislature over basin of origin and trying to undo 1041 and keep the balance that we have for a period of time and work with it. I think we are in a very good state, as Doug said. We are in an excellent and interesting position. I think we can make the institutions and the legal structure that we have work. I think we have demonstrated that with some of the agreements that have come about recently. It is tougher on the federal side. The Fish and Wildlife Service playing the gorilla in the closet and the 15-mile reach are really difficult. It is real tough to get the federal agencies to sit down early on and identify what their issues and concerns are. They are starting to use a lot of disclaimers in their decisions that say we can come back and visit this later. I think that within the state I feel very comfortable with the situation we have today. I think that in terms of the state agencies, the federal agencies and the local agencies, we have to find a better mix and a way that we can work together and not have the federal government have veto power.

A: (Unknown) I think the institutions we have are sufficient. I think it is important in these cases that an institution, however, be perceived as a legitimate institution and one that is the proper agency or the proper institution that ought to be addressing the problem. Institutions are made of people as well. When you are talking about an ethic or responsibility, you are not talking about the ethic or responsibility of the institution but the people that make up that institution. If individuals cannot change

their spots, so to speak, then they should be changed themselves.

A: (Richard L. Gustafson) I think the institutions that exist today are changing. I think they are changing within their own operations. I think that people are changing; the ideas are changing; people are becoming more receptive to new ideas; they are finding out that technology and other solutions are available, and that the old parochial positions have not been effective in the past and they are looking for new solutions. I think in addition to open forums and some discussion organizations, your basic institutions are changing in their philosophy. Part of it is, the Eagle River Assembly took a delegation to the State Legislature, and this involved both Front Range and West Slope people at the same time. We asked the Legislature, basically, to not screw around with the system for awhile. We said, "Let us talk within the parameters that currently exist and don't create a moving target for us, because we are making headway. If you keep changing the rules, no one can ever make headway. Let's leave it along for a while at least until we find out if this process works. If it works, fine, we can proceed, and we will all jointly make recommendations as to whether the law should change. If it doesn't work, then you go back to your old way of fighting. Someone once asked the question, "What is a statesman?" The person answered the question, "That is a dead politician." The first person said, "Then we need more statesmen."

A: (Doug Kemper) I think there is some change that is going to take place in the law over time. The organizations are changing. What we need to do is have more encouragement for more flexibility and more attempts to see where these links between our systems are and how we can best meet those needs. The result of what we do is going to be improvement of our local watersheds. That is really what I was referring to in my earlier comments when I said "Hell, no." It is focused on where the interests are. The more that we can get those out and the more that we can encourage those things to happen, the better off we are going to be.

Q: (Ruth Hutchins) I would like to make a suggestion to Mr. Kemper. While the Colorado East Slope/West Slope people are feeling quite secure in their advancement in promoting their understanding and being able to divert water to the East Slope for their benefit, Mr. Kemper says let the lower basin states resolve their own problems. Their own problems start here in Colorado and it is water that originates in Colorado, and that is the solution to their problem. You better pay attention.

A: (Doug Kemper) I don't think it is a matter that we are not paying attention to the situation. From Aurora's current water supply situation, I don't see California coming out and shutting down Homestake II. We had an interest in Twin Lakes and I don't see them coming and usurping our existing supplies. I don't see that happening. The studies that have gone on have shown that just to have a compact call come up in the Colorado is a pretty rare event. The immediate threat to our water supply systems I don't feel is coming from California. It may be coming from the federal government, it may be coming from other regulations, it may be coming through how we deal with our projects. We are spending a lot of money now going back and looking at our original Homestake project that was built 25 years ago and changing around some of the structures there, trying to have them blend in. It is right next to a wilderness area and we are trying to have them blend in a little better with the environment there. We have worked on moving the instream flows, where they originally were focused at a couple of different points they are now spread out a little more over several of the smaller sub-basins. We can't focus on everything at once. We have only so much energy to deal with. I can't go out there and try to deal with California's 34 million people. I have to deal with Aurora, and we have plenty on our plate right now. Unless we understand what the watershed-based values are, what the needs are within Colorado, how in the world are we ever going to articulate those to California or anyone else?

What is the Potential of Urban Water Conservation?

Scott Chaplin

Rocky Mountain Institute

This is a wonderful conference, and I think one of the reasons you can tell is by the shoe test. We have a wide variety of shoes here -- golf shoes, Berkenstocks, and running shoes. Ten or 20 years ago when you went to a conference like this everyone was wearing wing-tip shoes and a tie. I think this is a mark of the future, and it is a nice sign.

The main idea I want to leave with you today regarding efficiency is that for the most part the urban giant probably could quench its own thirst, at least for the next ten to 20 years. The technology is around and is available to save 30 to 50 percent of urban water use. There are new methods being developed, especially with regard to reclamation and reuse, that will enable us to save even more. The problem is that there are legal, institutional, and managerial options that are keeping most communities from reaching their full potential. And even when all those obstacles are overcome efficiency will not solve our long-term water problems, because of population growth. Basically, efficiency is a tool to enable us to bridge a gap between now and when communities get together and decide how big they want to get, how much of their environment they want to save, and how much they want to spend on water resource management.

For those of you who are not familiar with Rocky Mountain Institute, we have been doing research and writing on efficiency issues, primarily energy efficiency, for the past ten years. About five years ago we started a water efficiency program.

"Conservation" began in the 1970s. For the most part this meant deprivation -- put little washers in your shower so you had a wimpy shower, letting your lawn go brown, and a lot of other things that were not really pleasant, and so people got a bad taste.

In contrast to "conservation," one of the things we promote at Rocky Mountain Institute is the concept of efficiency. Efficiency means you get the same or better water services using less water. Efficiency is part of what we call the end-use, least-cost planning process. The reason we are taking this seriously and the reason why everyone should also is that in general efficiency, or "demand-side options," are cheaper than supply-side options. This is being realized by many large utilities, especially New York City. The city just sold a $26 million bond issue, not for sewage treatment expansion, but to finance toilet rebates. New York City did this is to avoid spending $1.8 billion on sewer treatment and water treatment expansions.

The other thing about efficiency is that it creates less damage to the environment than supply project, and saves a tremendous amount of energy, especially in areas dependant on pumping water. Waste efficiency also reduces operating costs at water and wastewater treatment plants, and can postpone and sometimes delay indefinitely any expansions of water or wastewater treatment plants.

Finally, and this is something that is coming up in the future, federal funding for water treatment or wastewater treatment plants may soon be contingent upon your community's having comprehensive efficiency programs. You may not get the funds to do the expansion unless you already have an efficiency program underway.

With end-use, least-cost planning, we take a more holistic approach, and consider all stakeholders. We are not just looking at the water utility and the public, but also energy utilities and environmentalists, bringing everyone into collaborative processes. I have heard the words "collaboration" and "corroboration" go around a lot the last couple days, and I think I am going to try to define them a little bit better, because some times they are used a little vaguely. I think there are some important distinctions.

First, however, I would like to talk about some of the benefits of water efficiency. For one thing, you have reduced financial risk. You do not need large, irreversible commitments of funds. Communities have

sometimes overspent on their water supplies and they end up in financial trouble. I think the supply project mentioned earlier today was a particularly good example. It took years to complete and decades to pay off. Efficiency can be implemented very rapidly on a scale of months, not years, and it can be done incrementally. You don't have to build a huge new supply with efficiency; you can do it one toilet at a time. This reduces capital needs. As I mentioned earlier, efficiency is generally cheaper than new supply and it lowers utility costs. It will increase your system reliability and help avoid treatment plant expansions. There can also be a link, if it is done properly, with improving water quality.

One of the things that is really important in terms of trying to sell this program is the savings to the consumer. *Consumer Reports* did an article a few years back showing that just from changing toilets alone, the average consumer can save $15-$60 a year. We have a report showing that consumers will save between $26-$175 by changing their showerheads.

Another thing that efficiency can be used for is to alleviate conflict. On the utility level, such as in the case of Denver, you might be able to avoid public outcries against a new supply project. On a larger level efficiency can enable two entities that are fighting over water, say two states or two basins, to find a win-win solution. Tribes can obtain the water they are entitled to. States can share the water that they have between them. Also, it can help alleviate instream flow conflicts. Oregon and Washington are two states to watch in this area. They are enabling farmers who save water to dedicate some of that saved water to the instream flows and retain rights to the rest. This gives a real incentive to save and it helps alleviate the instream flow problems.

Let's talk about a few effective efficiency measures:

Metering--I think most people are pretty convinced of the need for meters. Metering has saved between 10 and 30 percent in most communities when they bring it in.

Rate structure changes--Moving from either a flat rate or other type of rate to an increasing block rate where you pay a small rate and then an increasing amount as water use goes up.

Leak detection and repair, reclamation and reuse.--Being developed primarily in California but also in Colorado, and I think we are going to see a lot more of it in the future. Reuse is a reversal of the old philosophy of having the intake for the water supply up- stream and the effluent pipe down stream. Many cities are reversing that and reusing water again and again. Since the consumptive losses of most municipal users are rather small, this will be a significant source of efficiency-based supply.

Indoor fixture retrofits--the day and age has come for this. The National Energy Policy Act set plumbing and efficiency standards which most of you are probably familiar with already: 1.5-gallon per flush toilets and 2.5-gallon per minute shower heads and faucet aerators. These standards, however, are not the highest in the world. People think, "Wow, can't get much lower than this," but in fact, Australia has a standard for toilets which is twice as efficient as the U.S. standard. They have the 1.5-gallon per flush toilet with a dual-flush mechanism that cuts water use almost in half. This kind of fixture now is being used in the White House and they are beginning to install them in the Pentagon, although I think in the Pentagon it probably will not be cost effective, with their $10,000 toilet seats. It will be interesting to see how the numbers come out on that one.

Lawn watering--Mr. Nelson will be talking about this a little later. He has a cash-for-grass program which is not a drug deal, I don't think. There are also successful leak detection and repair programs targeted towards landscape water use.

In the future we are going to be seeing some other things.

A lot more reuse, maybe even composting toilets -- especially for parks and public rest areas.

Rainwater collection--actually becoming big in Europe and also in Japan. The Tokyo Bowl, the largest place where they do sumo wrestling in Japan, uses rainwater for all toilet flushing.

Great water systems--California is taking the lead there.

Advanced metering--In Europe, people have meters in their homes that they can see. They can receive immediate feedback, and sometimes have separate meters for their hot and cold water.

There is a difference between the technical potential of what these technologies can do and how we get people to use them. Some of the things we are looking at in terms of getting people to use these are:

Ordinances and standards--which are usually up to the community or the state. In a lot of states you can still buy the old fixtures and in fact they are now on sale, so it makes them even more attractive. Some states have banned the sale of inefficient fixtures. That is a very insightful jump, and it avoids a lot of unnecessary wasted water.

Hookup fees--Many communities are basing their hookup fees for new construction on how much turf you have, so that is a very simple way to have efficiency implemented.

Giveaways and rebates--Many communities are giving out $100 rebates for toilet replacements. Generally this is cost-effective from the utility standpoint just in terms of the cost of new supplies of water.

Grants and loans--These are happening particularly on the wholesale water level. The wholesale water supplier will pay its retailers a certain amount for every acre-foot of water they save. They will base that on their cost of new water supply. For instance, the Municipal Water of Southern California pays its retail agencies $154 per acre-foot for every acre-foot they save.

Education and promotion--Something that should not be forgotten, particularly in the landscape industry. We need to have more bilingual information available there.

Some of the more advanced methods that are available are:

Transferable savings--Morro Bay has an interesting law. A new developer has a choice of paying the regular hookup fee, which is high, or saving twice as much water as they will need somewhere else in the community.

Competitive bidding--This is something that is happening in the electrical utility industry, and I think it may start happening in the water industry. If a utility needs more water supply it puts on a RFP saying, "Ok, we are going to pay so much per acre-foot, and who can supply that?" Water service companies that specialize in retrofitting large hotels or businesses will say, "We will do it for X amount." You get the lowest bid and they will come into the community and save that water so the costs to a city or utility are not out of pocket.

Limited use contracts--These give a tremendous opportunity to limit peak demands.

Utility partnerships--In many communities the water and energy utilities are getting together. Energy utilities are about 10 to 15 years ahead of where the water utilities are, but the gap is closing. Energy utilities have often gone door-to-door and given out compact fluorescent lightbulbs and helped people do insulation. Now, water and energy utilities are getting together and financing these door-to-door programs or other types of programs. They not only give customers a light bulb but a showerhead, and tips and help if they have any leaks or other. So, you share the costs.

Using local, nonprofit organizations. This is a great way to incorporate the community. My favorite example is the Mothers of East L.A., a nonprofit organization in Los Angeles. It is basically mothers from East Los Angeles who were involved in various environmental efforts such as fighting toxic waste incinerators. Unemployment is very high in this part of Los Angeles. The city had a toilet rebate program where they were giving away $100 per toilet for every one retrofitted, but low-income people could not afford to do this. A third party joined in a partnership, bought a large quantity of toilets,

distributed them, and helped get them installed by hiring local unemployed people. The Mothers of East L. A. received the $100 rebate per toilet. The program only cost them about $70 per toilet, and they used the other $25 to pay the formerly unemployed people salaries and fund a child care program. That is the kind of unique example of what partnerships can do that I hope does not stay unique.

I briefly want to give an example of some of the savings that can be accrued through a simple showerhead and faucet retrofit. A single household will save between 6,000 and 15,000 gallons of water every year. Toilet retrofits would be closer to 20,000 or 30,000 gallons per year just for a single household -- a significant amount of energy equivalent to 1 or 2 refrigerators and a large amount of carbon dioxide -- and then to the consumer the bottom line of $25 to $170 per year in their lowered energy bill. Basically, by just using the technologies that work well and are available, the average home indoor use per person can go from 77 gallons to 50 gallons.

Unfortunately, one thing that a lot of utilities did was what they call "skimming the cream" or taking the shotgun approach to saving water. They go door-to-door and give one showerhead and maybe a toilet dam. The problem with these toilet dams is that they are not reliable and do not provide long-term savings. You put one in and the toilet doesn't work as well, so people usually take them out after three to five years. And if you give one single showerhead to everyone in the community, you are not going to get a very high acceptance rate. Communities have to take a comprehensive, targeted approach to implement these programs. That means not taking the shotgun approach, not trying to give it to everyone, but to focus on the places where you have the most number of toilets used by the greatest number of people. One example of this is New York City, which did a retrofit of four apartment buildings and had savings averaging 30 to 40 percent. You get a much higher rate of return on replaced toilets if you go to a densely populated area rather than the suburbs.

So how does efficiency fit into this concept of end-use planning? If we look at the average price of water in the United States we are looking at about $500 an acre-foot: to dig a well about $600 per acre-foot, to dam a river $750, to desalinate $2000 an acre-foot, to build pipelines from Alaska $4000 per acre-foot; some of the other crazier ideas like dragging a bag from Alaska is also around $4000 acre-foot, and at the bottom efficiency comes in at $200 or less per acre-foot. Generally speaking, water efficiency is your cheapest supply option.

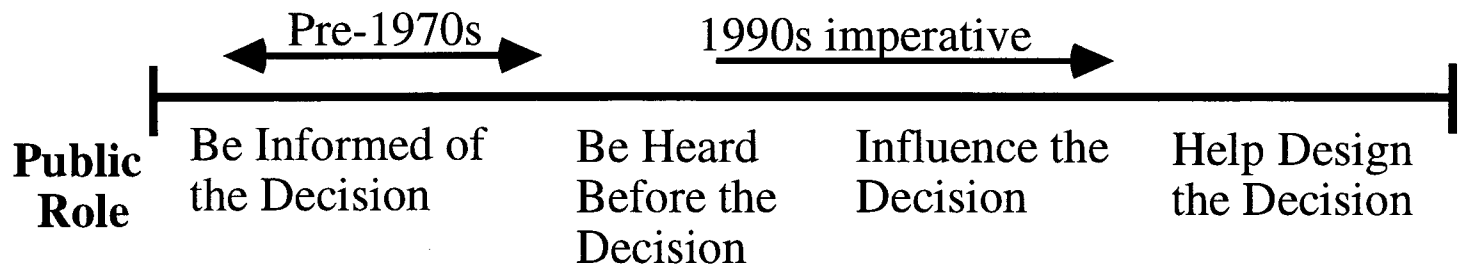
Why isn't efficiency happening more? One reason is water law, which I will not touch here because I do not have the time. Institutional resistance to change is another reason, and I think Dave Little yesterday underscored the message that Denver has turned a corner and taken a major change here. I think we see a lot of other hopeful signs. The new Bureau of Reclamation is doing some wonderful things. The American Water Resources Association is setting up a clearinghouse in Denver. Chris Bridges will be talking later today about some of the things the State of Colorado is doing. Even the Environmental Protection Agency is not the wicked witch of the east any more. It has got some problems it needs to work on, but the municipal assistance branch and some of its work on integrated watershed management is very promising. So, whereas water efficiency is going to be a tool to buy us some time, what is really needed is collaborative public involvement in integrated resource management planning.

Not everyone in Colorado is in favor of high growth, but water management can influence how we grow. It is like the movie Field of Dreams, "If you build the sewer line people will come." People have seen this all over. Figure 1 shows what has happened with the public's role in decision making. In the 1970s people in their wing-tipped shoes and ties in a back room made a decision on what to do, and they later informed the public of the decision. Later, after the 1970s, the public was invited to be heard before the decision was released. Now what we are moving toward is actual public influence on the decision and public decision making. We heard the word "cooperation" earlier today. That is when the decision is already made and the utility, or whomever is making the decision, tries to get the public to go along with it. It sounds to me a little like getting mugged. "If you cooperate, you won't get hurt." What we really want to move to is collaboration. As Marcia Hughes said yesterday, collaboration efforts are very worthwhile. They are essential, and you won't get much done with out them.

I want to read something from Peter Johnson, former Director of Bonneville Power Administration, an energy utility that is now doing collaborative public involvement.

Figure 1.

The Public's Role in Decisionmaking



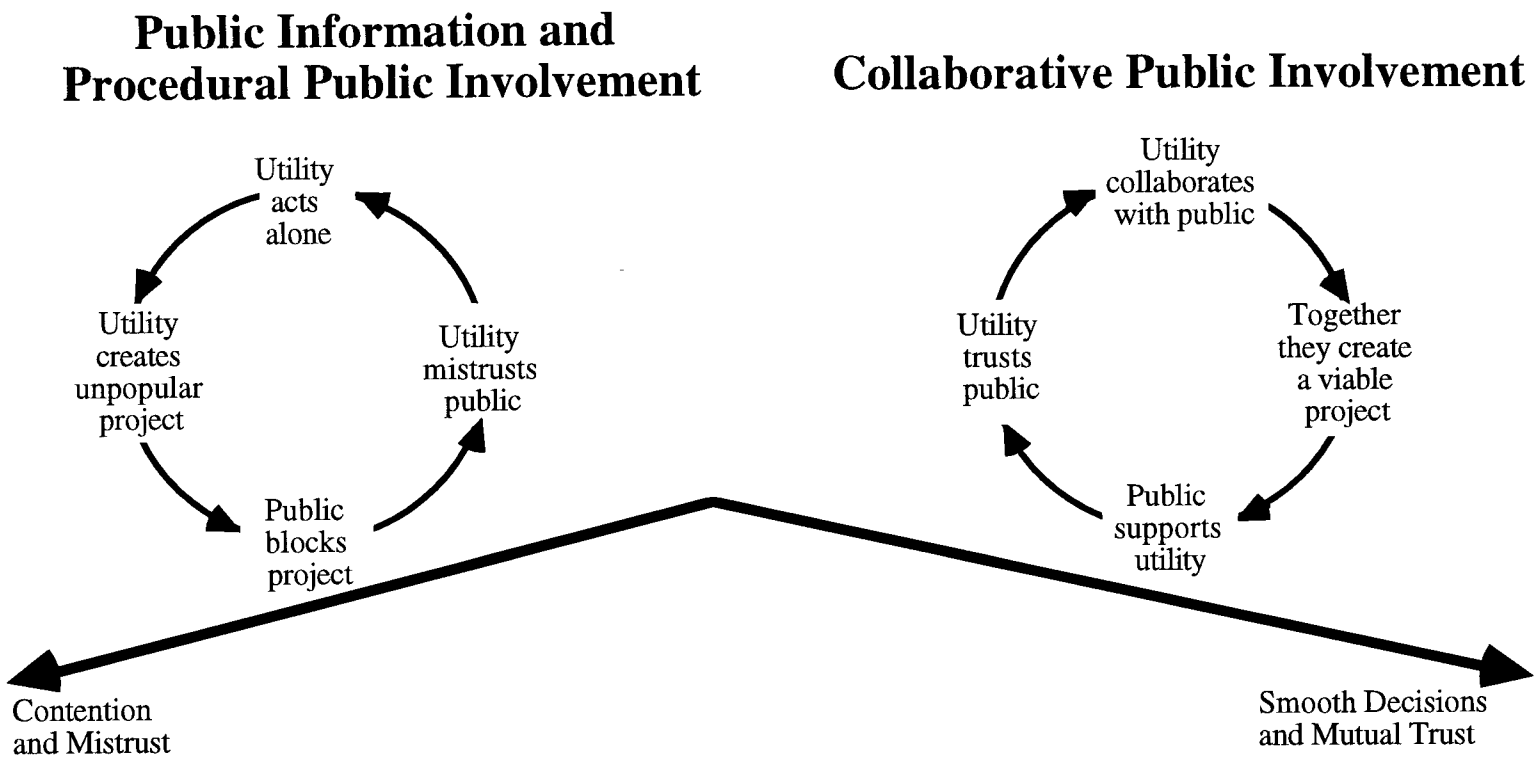
Source: Rocky Mountain Institute, 1994.

By involving the public in the decision making process itself we gained authority and legitimacy, avoided costly lawsuits and political challenges, and arrived at creative solutions to seemingly intractable problems.

I think that public involvement would be very worthwhile for the water field at the local, state, and also the interstate level. In the past, a water utility made a decision and sent it out to the public. Now the water utility is working with the public to come up with a common solution. As shown in figure 2, there are two cycles that can happen here. The first cycle is the way things used to be done: the utility would act alone, create an unpopular decision, the public would block the project, the utility would mistrust the public and not want them involved next time at all, and so create a vicious cycle that would lead to contention and mistrust. In the second cycle, collaborative public involvement, the utility works with the public to make decisions. They don't have a position yet. They don't say, "We need a dam;" they say, "We need to meet future water demands." The public comes to the utilities not saying, "We don't want a dam," but "We want to preserve the environment." These are the values versus the positions we were talking about earlier. So the utility will collaborate with the public, reach a decision together, and create mutual trust, a vicious cycle that gets better and better.

In conclusion, I would like to stress that the role for urban water conservation, or what we like to call efficiency, in many cases, is to replace traditional supply projects such as dams, reservoirs, and canals. This is usually the appropriate role for efficiency because it is often cheaper and leads to greater overall system reliability. Finally, whatever projects a utility undertakes, whether they be new traditional supply projects or efficiency, involving the public will lead to faster approval and more congenial public-utility relations. Thank you for your time.

Figure 2.



Source: Rocky Mountain Institute, 1994.

Profiting from Water Conservation

A California Example*

John Olaf Nelson

General Manager, North Marin Water District

About North Marin Water District

North Marin has been practicing water conservation as a demand management strategy for 24 years. The District is located 40 miles north of San Francisco in a series of inland coastal valleys blessed with a moderate climate. We serve a suburban community of 56,000 population and have 17,225 active connections that serve institutional (government), commercial, and 20,800 residential dwelling units in single family detached and multiple settings. The total service area encompasses 100 square miles and includes six separate enterprise districts, four water and two sewer, each with their own set of books, rates and charges. The foregoing statistics and my talk today refers only to our main service district - Novato, California and the surrounding area. It is a community spread over about 42 square miles. Rainfall averages 27-inches a year and only trace amounts fall in the summer months (Figure 1). Unlike the west slope of the Rockies, our growing season is long and dry. Reference evapotranspiration peaks in July and generally averages about 46-inches per year (Figure 2). Assuming an overall irrigation efficiency of 60%, a value we can achieve in large sites with acres of lawn area (turf) - like park settings, the applied water requirement for the cool season grasses which abound in our area is about 34-inches per year (Figure 3).

Our water service mission is to provide a high quality, reliable water supply at reasonable cost with well-trained, competent; and most importantly, empowered staff with management systems in place which achieve feedback on how well we are doing so that we can constantly improve our service. We have a flat table of organization comprised of an administration, operations, engineering, and construction/maintenance division. All division chiefs answer directly to me. There are no intermediaries.

We rely entirely on surface water. Local surface supply represents only about 20% of the total (Figure 4). The remainder is imported overland via a 40 mile long aqueduct from the Russian River, a coastal river to the north which drains to the Pacific Ocean. We are thankful that because of the reservoir storage we jointly enjoy with the region and because of reasonable amounts of rainfall that our area has not suffered the severe drought problems plaguing the rest of the state over the past 7 years.

Water Use Characteristics

To run a good conservation program, a water utility must know about its customers and how they use water. Figure 5 shows a basic breakdown of our customers. We serve principally a suburban area. Residential use makes up 85% of the action, commercial use 11% and government use 4%. Government use is dominated by irrigation requirements for parks, and playing fields. Note that outside use amounts to 39% for both residential and commercial use and jumps to 73% for government use. Overall outside use amounts to 40%. When we break down the use further, we see that single family detached dwelling use predominates, accounting for 64% of all use and 75% of all residential use (Figure 6). When we break down residential use (Figure 7), we find that townhouse/condominium (THC) use is 150 CCF/year (1 CCF = one hundred cubic feet = 748 gallons) or 20% less than single family detached home (SF) use which is 188 CCF/year, and apartment (APT) use which is 104 CCF/year. Outside use is 41% for SF use, 45% for THC use and, as you would expect, drops way down to 21% for apartment use. For those who like to think in terms of gallons per capita per day per dwelling unit, I've included Figure 8. In order to design effective water conservation strategies, it is necessary to categorize and track water use to this detail.

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* Edited tape of speech presented at the 1994 Colorado Water Workshop, Western States Colleges, Gunnison, Colorado, July 21, 1994

Where the Action Is

From the foregoing figures we see that residential use is 85% of all use and that outside use is 39% for the residential class. Government irrigation and residential are the principal targets. The "action" in residential use is turf irrigation, toilet flushing (including leaks) and water for bathing - principally showers (Figure 9). Turf accounts for 32%; toilets explain 20%, and showers explain 18% for a total of 70% of all residential use. Another significant residential use component is clothes washing, which accounts for 13%. However, washing machines are not in our target program right now because we do not think we can do anything about them at the local level just yet. We think that national efforts to bring a number of reasonably priced horizontal axis washing machines onto the marketplace is necessary before we address this water use segment. So turf, toilets, and showers, "TTS," represent the focus of our current water conservation program.

Basic Financials

As a water manager, I appreciate that those of you working on the "supply side" of the water supply problem always want background on water rates to be sure the speaker is not holding forth on an anomaly. Well, our rates are moderate by California standards as shown in the following table:

CURRENT RATE STRUCTURE

- Uniform commodity rate ..... $0.97/CCF (varies by zone)
- Plus fixed bimonthly charge ..... $8/dwelling unit (du)
- Also ad valorem bond tax $20/du/yr
- Typical revenue per SF du:

Commodity rate	$167	71%
Bimonthly charge	48	20%
Tax	20	9%
Annual total	$235	

It costs our typical single family detached home customer about $235 per year for water service. Seventy percent of the money comes from a uniform commodity rate; 21% comes from a fixed bimonthly charge; and 9% from an ad valorem bond tax which is included in the semi-annual property tax bill. So we receive 30% of our revenues as fixed income and 70% varies, basically as a function of water use which in turn is affected by weather and our water conservation program. We do not employ and I do not personally subscribe to steeply inclining block rate structures except as a last resort for the simple reason that I think we can accomplish sufficient conservation (10 - 15 - even 20%) without resorting to this type of, generally unpopular, rate structure.

The facilities reserve charge (connection fee) that we charge is characterized in terms of equivalent single family dwelling unit (EDU) demand that occurs during the peak summer month. In our area 1 EDU uses 636 gallons per day during the average day of the peak month. The peak month is generally July. It is this average day peak month demand that dictates much of the capacity we build into our system and therefore we believe that using this parameter is a relatively fair way to allocate capital expense invested to accommodate new connections to the system. Current connection fees are shown below:

FACILITY RESERVE CHARGES

Single family detached dwelling unit	$2,940
Townhouse/condo dwelling unit	2,350
Mobile home dwelling unit	1,510
Apartment dwelling unit	1,380
Second dwelling unit	1,380
Senior citizen dwelling unit with kitchen	980
Senior citizen dwelling unit without kitchen	760
Non-residential use, per equivalent dwelling unit	2,940

To round out this section I would note that our basic financial philosophy is that:

- operating revenues should always exceed operating expense;
- emergency operating, contingent liability, and maintenance and repair reserves should be maintained at a healthy level;
- cash flow analyses (at least projecting 5 years into the future) should be performed at least annually
- rates should be adjusted frequently and in small increments to reflect cash flow deficiencies identified; and
- an internal and external audit should be conducted annually.

Following these principles avoids rate shock for customers, maintains revenues adequate and keeps the utility best postured to respond to emergencies and drought.

Why Conserve Water?

At North Marin there are two major reasons: financial and environmental. On the financial end, as far as variable costs, I noted that our typical customer pays $235 a year for water service. That translates to $540 per acre-foot. About 20% of that cost is variable. It varies as a function of the cost of chemicals and energy expended to produce and deliver water to the customer's elevation. Our remaining costs are debt authorization, a fixed cost that cannot be avoided, and labor. Labor is also essentially a fixed cost in the water business. Water utilities cannot staff up and down to meet seasonal variations in demand but most maintain a cadre of trained, certified experts to operate the utility plant. The same number of meters need to be read, bills rendered, the treatment plants usually need to be run continuously even if demand is down, et cetera. In fact, in a crisis which causes reduced demand (drought, severe system outages, et cetera) labor demand on the utility generally increases due to customer demand management strategies that need to be implemented and/or extraordinary operating needs associated with the crisis that cannot be deferred.

If water is conserved, we can reduce variable costs. In the case of conservation which produces permanent reductions, such as removing/avoiding turf and retrofitting ultra low flush toilets, we might even capture enough savings to defer some capital projects. In North Marin, for instance, conservation combined with reduced growth has deferred construction of a major parallel aqueduct for 7 years, and I think we can defer it a few more years. We have also deferred finished water storage (tank) construction.

Conservation, focused on reducing or avoiding irrigation demand during our peak growing season is particularly effective in reducing peak demand requirements. Our historic peak month to average month ratio trend is shown on Figure 10. Not all of the reduction indicated is due to conservation. Some is due to a changing housing stock mix and other reasons, but some of the trend is due to the District's irrigation efficiency and turf reduction programs. Focussing on conservation strategies that reduce peaking demands results in more bang for the buck. In the case of North Marin, we can also leave more water in the Russian River for fish and recreation purposes, or, alternatively at certain times of the year, in storage to increase security against drought. We can also reduce effluent that is disposed of in San Pablo Bay (part of the San Francisco Bay system) where the sewage treatment plant serving the Novato area disposes its treated effluent in the winter months; and finally, we can reduce non-point pollution that goes into the gutter due to wasteful turf irrigation practices.

Water Supply Game Plan

How do you balance supply and demand? Figure 11 shows our game plan. The left-hand column shows demand projected to build-out and includes existing demand, additional new demand due to new building and, as a separate category, potential new large turf site demand.

The right-hand column shows how we plan to supply the sum of existing and projected demands. Capability of serving 58% of the total is already available and on line in the form of surface water supply facilities. That is the bottom block. The next 18% we intend to acquire by expanding the aqueduct system that imports water from the Russian River. That will cost a lot of money and we are trying to handle it on a cash accrual basis (connection fees and retained earnings). Therefore if we can defer that investment as long as possible we are money ahead. The next 12% will come from recycled water projects we expect to build. The neat thing about tapping recycled water in our plan is that creation and expansion of this capability is a direct function of whether or not the large turf demand noted in the left-hand column comes on line or not. One new golf course located in the right place can cost effectively trigger construction of the recycled water plant and interconnecting pipeline. Additional courses or parks, again strategically located, can thereafter be served by extension of the pipeline system and expansion of the reclamation plant in modules. We have master planned this strategy. It is very sensitive to geography, i.e., the distance of candidate recycled water irrigation sites from the wastewater resource, but the strategy is sound and is on the shelf awaiting implementation when that first large turf irrigation site applies for water. Regulations are in place to assure the necessary site specific feasibility report is done and, if cost effective, require implementation and use of recycled water by the applicant. Recycled supply therefore represents a hedge against future large site irrigation.

Lastly, 12% of our supply represents the amount we intend to avoid through conservation. Realize that is 12% of a planned total supply of 28 mgd which already includes a 7% safe margin or cushion. Expressed in terms of projected demand this translates to planned long term water conservation of 13%. In actual practice we have set a goal of 15% to increase our safe margin to about 9%. That is our game plan. In today's technical jargon it represents the output from an Integrated Resource Plan. It is important to note that in order to be viable, it must be constantly reviewed and updated. Questions like: is the reliability of surface water supply elements holding up? Are new growth estimates valid? Is the recycled hegemony working or is more new irrigation demand impacting potable water supplies at a rate greater than expected? Is long term conservation truly being realized. These and other questions that arise must be studied constantly and answers found and the game plan revised accordingly. In the process, all stake holders need to be kept apprised and involved.

Water Conservation - How Do We Do It?

We do it principally through implementation of what I call "hardcore" conservation programs. Programs targeted at the things that we can have an impact on, namely turf, toilets, and showers. We also have a lot of "soft"conservation activity going on: education of youth, education of adults, targeted promotions, general information, public xeriscape gardens, displays at fairs, speeches, contests, and screwdriver maintenance. Screwdriver maintenance is what we call a program which allows our field service representatives to, on their own volition, go above and beyond the normal. If, for instance, a customer is elderly or seems in need of help, the field service representative is authorized to find and cap leaks, replace a flapper valve, change out a faulty ballcock assembly, et cetera. This program is not advertised and is only done on a reactive and limited basis. You cannot get by without the "soft" stuff because it supports and reinforces the hardcore programs. However, if you are not into hardcore programs, you are not into effective urban water conservation in my view. Let's now talk about the specific hardcore targets, TTS, and how we address each.

Turf Strategies

Turf strategies need to be separated into two categories, because the strategy is different for each category.

Large Turf Sites

Irrigation of large turf sites (parks, golf courses and playing fields) can be done efficiently, but it requires good design and disciplined application of water. We have very tight design criteria for large turf sites which must be served by our potable water system, namely:

- designing the system to match precipitation rates to infiltration rates
- head-to-head spacing of sprinklers
- heads grouped by terrain
- valve in every head (generally)
- minimum pressure requirement at each head must be met
- programmable control of system (number of irrigation days, minimum capability of 3 irrigation cycles/day, run time/cycle, water budget scaling, rain cut-off)
- lower quartile uniformity coefficient >80%
- irrigation scheduled by District irrigation advisory or on-site weather station

Also required is pre-site analysis and post-site performance testing.

Take a new golf course coming on line. It will have its own weather station for optimum irrigation management. Each sprinkler head on the system will have its own check valve to prevent system drain down. Heads will be grouped by terrain and each group will be programmable. Lastly, each programmable valve will be able to handle syringe irrigations - at least three per day, during the irrigation season. The controllers will allow override proration of applied water to accommodate changing ET and wind conditions and accommodate shut-off during rain events.

We have undertaken a lot of instruction targeted at large turf site managers. All large turf sites in our service area have also been subjected to an extensive audit. Here is a good example - Marion Park, a baseball field and soccer field maintained by the City of Novato Department of Public Works (Figure 12). The irrigated area is 2.5 acres. You can see by comparing the typical demand curve before we did the audit to the curve after the audit, that principally due to avoidance of over watering in late summer and fall, 18% of the applied water was saved. Cool season grasses are dominant in our climate zone. They tend to reach maximum stress by August. The turf manager's reaction is to apply fertilizer and keep the water coming and this goes on much longer than needed as ET drops. Now let's track applied water at Marion since 1985 (Figure 13). Note that through increasingly better maintenance and control, the turf manager has reduced demand at this site from about 45-inches per year to about 26-inches per year, a reduction of 42%.

At North Marin we have audited all twenty-one large turf irrigation sites in our community, 74 acres of irrigated turf in all. Water savings, based on a standard parametric analysis approach was determined by NEOS Corporation (Reference 1) to be 16%. The cost of audits ran about $200 per acre. The annual out-of-pocket savings for the customers was $237 per acre foot for water and energy. The benefit/cost ratio to the District was calculated by NEOS Corporation to be 6.7. Simple payback was 0.6 years. (When you are building a dam you are lucky to get a 1.1 benefit/cost ratio.) The analysis assumed the audit had to be repeated every 5 years to assure continued participation.

Small Turf Sites

The second category of turf irrigation is irrigation of small sites such as townhouse projects, most commercial sites, and single family detached home landscapes. Research on planned unit developments, like townhouse projects that we conducted in 1985, showed that the applied water requirement was different for townhouse projects whose landscapes focussed on plant materials (xeriscapes) versus projects whose landscapes were more traditional in nature and focussed on wide use of irrigated turf (Reference 2). The difference was 27-inches vs. 53-inches respectively or 47% less water (Figure 14). We monitored the project carefully, interviewed the maintenance contractors, and determined reductions for not only water use, but labor expended, fertilizer use, fuel use and herbicide use (weed

control). The results are shown on Figure 15. There were savings in all categories. The xeriscape projects had an average of 316 sq ft of turf per dwelling unit vs. the traditional projects that had 710 sq ft of turf per dwelling unit. Total square footage of formal landscape area for the xeriscape projects was 10% less than the traditional projects so that explains some of the difference in water use but does not change the conclusion that the xeriscape projects were more efficient in every way. Economic savings were calculated (Figure 16) and amounted to a net savings of $75/year/dwelling. As a result of this research and because of the difficulty in achieving efficient irrigation of small sites, North Marin decided to offer credits to encourage less turf in new development.

We had given up trying to achieve irrigation efficiency for small turf sites because of the geometry of the problem. Basically on small sites, the present state-of-the-art for irrigation equipment results in a well designed inground sprinkler system applying about 1.2-inches of water per hour whereas the clayey loams, common to our area, can only absorb water at the rate of about 0.25-inches per hour. The results is lateral runoff within about 12 minutes. Well, 12 minutes is not enough water to meet the evapotranspiration (ET) demand for grass. To mitigate this mismatch of precipitation rate to inflation rate, the irrigator must resort to syringe or cycle irrigation. About 3 cycles of irrigation that are 12 minutes long and separated by at least one hour repeated for each of 3 days staggered over an irrigation week is the best and most efficient way to apply water in our peak ET demand month. But only expensive controllers are equipped to permit this type of syringe irrigation and studies have shown that homes with inground sprinkler systems use more water than homes without such systems. We concluded the best approach was to avoid or reduce turf use, so we try to encourage the developers, through discounts on connection fees, not to put turf in or materially reduce same in favor of water conserving plant material. By "jawboning" we have done a pretty good job on reaching developers. Response is strictly volunteer on their part. Our overall goal is that new residential sites reduce the amount of turf traditionally used by about 40% (see Figure 17).

In 1992, after careful research, the District added its "Cash for Grass" program which offers a rebate to the owner of residential property (or renter with owner's consent) if they volunteer to reduce the amount of existing formally maintained and irrigated turf area. The rebates offered are the same as the credits previously (and still) offered to new development and are shown below:

REBATES/CREDITS

Type	Criteria	Rebate
New Development		
SF	<800 sf*	$200/du
THC	<400 sf*	150/du
APT	<130 sf*	100/du
Existing Landscapes	$35/100 sf	$200 max/du

*or 20% of the softscape are, whichever is more restrictive

Under this program, if a single family homeowner who is installing a new landscape for the first time puts in less than 800 square feet of turf, we pay $200 per dwelling unit either as a credit on the connection fee for the new home or as a rebate in the case of homes build on speculation. In the case of an existing homeowner who will tear out some turf, put in some other green growing plant material (we encourage water conserving xerophytic plant material but we really don't care what it is), and also agrees to modify any existing or new irrigation system to separately irrigate any remaining turf, we will pay $35 per hundred square feet of turf removed, up to $200 per single family detached unit. The rules are that the homeowner must apply before the grass is taken out. We do not encourage installation of an inground irrigation system if none existed before. New hardscape doesn't count in calculating the rebate eligible area (hardscape is concrete walks, rock, wood decks, et cetera as opposed to softscape which is planted with any manner of grass, ground cover, shrubs, tree or other formally maintained plant material). We require 4-inches of mulch placed around the new plants and inspection before payment of the rebate. Each applicant for the rebate signs a promise which states that if they put the turf back in they will pay the rebate back.

Research on Single Family Home Sites Show Xeriscapes Save Water

In the summer of 1993 the District conducted a study on the amount of water used by single family homes having mature landscapes with little turf area (xeriscapes) and homes which were more traditionally landscaped (Reference 3). We identified 452 single family detached dwelling units, half of which were xeriscapes which we defined as having less than 15% turf area in the front yard with vegetation dominating the landscape theme and having an appearance rating of better than 6 on a scale of 1 to 10, 10 being best. The other half of the sample had more than 70% turf area in the front yard, had to be on the same block as a xeriscape site, be of similar lot size, and also have an appearance rating greater than 6. We performed a detailed measurement of water use on these sites from July 1 to August 1, 1993, taking special meter readings. After August 1, we approached each homeowner with a detailed on-site survey to find out how they used water and took measurements on the backyards. Then we performed a multi-variant regression analysis to determine the difference in water use. The profile for the typical traditional home was a home with 1713 sq ft of irrigated turf area, had an average population of three persons, had an in-ground irrigation sprinkler system, had no swimming pool or other outdoor water feature, had a front yard appearance rating of 7.7, occupied a lot of 11,800 sq feet (0.27 acres), and was valued at $353,000 (remember Novato is a suburb of San Francisco, California). The analysis showed that, at the 95% confidence level, the annual average reduction in water use for elimination of each 100 sq ft of lawn in favor of xerophytic plant material, was 6 gallons per day per 100 sq ft of turf area. The coefficient of determination (r^2 value) was 0.4, not bad for this type of study. The profile for the xeriscape homes was very similar except that they had only 362 sq ft of turf. Overall the xeriscaped homes used 81 gallons per day (average annual) less water or about 17% less water overall. although many independent variables were studied, the most important explanatory variables turned out to be (in order of importance) home value, appearance, and turf area. Interestingly, the presence of an in-ground sprinkler system was found to increase water use on an average annual basis by 49 gallons per day or about 10%. This study served to confirm the importance of turf area in defining overall single family water use and confirmed our suspicions concerning inefficiencies surrounding use of inground irrigation systems on small sites.

The participation by new development in the District's credit and rebate program has been good. SF unit participation has been running 12%. THC participation is running 53% and APT's 99% (Figure 18). In terms of new housing stock added, overall participation in this strictly volunteer program has been 49% with no regulations, only an offer.

Regulations Prohibit Narrow Strips of Turf

Although North Marin generally avoids regulating customer use of water, we have made an exception in the case of narrow strips of turf on commercial or government sites. City planners seem to love to have narrow green islands of turf in parking lots, but irrigation of these proves very destructive to asphalt and the applied water requirements are very high. The theoretical applied water requirement for a narrow strip of turf (less than 16 feet wide) is 47-inches. On a project we audited we found the maintenance contractor was applying 141-inches of water per year (Figure 19). Furthermore, the best we could do with scheduling was to drop the applied water by 28%, down to a 102-inches a year, still 2.2 times what was theoretically necessary for turf installed on a larger site. The reason was that 102-inches had to be applied to get 47-inches to the turf. The rest all went for overspray and wind drift which could not be avoided given the state-of-the-art of sprinkler irrigation technology and the small geometry of this type of site. So, at North Marin we regulate against narrow strips of turf (Reference 4) proposed for commercial and government sites. We do this with an engineering formula. We call it the turf modulus, believe it or not. Basically, what it does is discriminate against turf areas that are less than 16-feet wide in the landscape design. Turf areas less than 800 square feet are also exempted from the regulation.

Toilet Strategies

Toilets are the second major target. We approached this problem with statewide legislation. We authored the 3.5 gallon/flush legislation in California which became effective in 1978. All new residential construction was thereafter required to use 3.5 gallons/flush toilets. Again in 1993 when the market was ready, we were the technical author of legislation requiring 1.6 gallon/flush toilets in all new construction. The National Wildlife Federation was very helpful in making this an environmental issue and thereby helped get this legislation passed.

Toilet Rebates

What about toilet rebates? A lot of water utilities are offering rebates to encourage early retirement of the existing population of older toilets. We offer such a program in one small water-short service area but have held off offering this program in our main service area of Novato. Rebates are expensive and the free rider percentage is high. Free riders are those persons who participate in a rebate program who would have done it without the rebate. If we were to offer a rebate program in our main service area, we would co-op it with local hardware stores and plumbing outlets. We have used a co-op strategy on other conservation devices before. For a toilet rebate program it would work like this. Most retailers use a keystone mark-up, i.e., they mark up the unit they sell by 100% of the wholesale cost. We ask the retailer to forego about 50% of his mark-up. On a toilet that sells for $120, that's $30. We'll kick in an additional $30 and print up rebate coupons that offer 50% off on a 1.6 gallon/flush water saving toilet selling normally for $120. We do the advertising on the offer and distribute coupons to our customers (bill stuffer usually). The retailer(s) get the traffic, and public recognition for participating in a worthy public program and 50% of their mark-up is restored when they turn in coupons they've honored to us. The people who participate will save $60 on a $120 toilet. Installation of the toilet will save at least 8 gallons per capita per day. Considering our avoided cost plus variable cost savings, the District's simple payback for this program is about 6 years. To avoid the negative publicity and ill will we would offer this to people who are remodeling even though California law requires that they install 1.6 gal/flush units anyway. We would not offer it to new homes under construction however. Cost to the District, assuming this offer was repeated cyclically until a 50% penetration was achieved is estimated at $702,000.

In one small service area we do offer a toilet rebate program, the rebate is held to $40/toilet, maximum of two toilets per home. The owner must also turn in their old toilet tank lids to us. In this small service area, we also require installation of 1.6 gal/flush toilets (and other water efficiency devices; i.e., showerheads and aerators) upon sale of the home. We have worked out a system that will not interfere with close of escrow in case the seller forgets to comply with the requirement (Reference 5). It works like this. The seller pays the District $315 per bathroom which does not comply with the retrofit regulations and notifies the buyer of the retrofit requirements. If within a year after close of escrow, the buyer complies, the buyer is paid $315 per bathroom by the District. If after one year the buyer has not complied, the buyer's water bill is surcharged 20% until retrofit occurs.

Retrofit Devices for Toilets

Twice in the 1970's when we experienced a water shortage, we distributed one quart displacement bottles (two per toilet) to our customers for placement in their toilet tanks. While helpful temporarily - principally as a public awareness program, participation rates dropped off sharply after the crisis. There are many retrofit devices on the market designed for toilets. Some work well but unit costs are generally high. We prefer programs supporting wholesale replacement with 1.6 gal/flush units.

Showerhead Programs

I will not dwell much on showerheads, suffice to say they are the single most cost-effective water saving item for the home. Excellent quality showerheads are available wholesale today for about $4 each. Water utilities should purchase showerheads in bulk and give them free to customers. Or alternatively a co-op program, as previously described, can be pursued.

Home Water Audits

The District has perfected the procedure for a home water audit (Reference 6). For single family dwellings this costs about $45 each and can be expected to yield savings of 4 to 5%. The audit includes leak detection in the yard, measuring the precipitation rate of any inground irrigation sprinkler system present, probing the soil beneath turf, designing an irrigation schedule, installing low flow showerheads inside, testing each toilet for leaks and repairing simple leaks caused by a misadjusted float, tangled handle mechanism, or leaking flapper valve. Our study showed that 18% of the toilets leaked. This is in a sample of 237 homes. Of the 18% that leaked, 81% of the toilet leaks could be easily repaired by replacing the flapper valve (the most common cause), or adjusting the flush mechanism, or the float. At the conclusion of the audit each homeowner was given a report containing specific results and suggestions for saving water.

Water Use Trends

I would next like to show you water use trends. Figure 20 shows overall water use in terms of peak month and average annual demand. There appears to be a substantive downturn in both. Figure 21 shows simple regression trend lines for use by customer class. Growth has occurred in all classes. Figure 22 shows trends per dwelling unit for each residential category. Note that unit dwelling use for every residential use category has declined, particularly in the townhouse/condominium category. Overall unit dwelling unit use for all residences is down 16%. Now we believe part of this is not permanent but due to customer response to statewide stories on the drought even though our area experienced no shortage in the last 7 years. How much of the 16% decline is conservation that is permanent cannot be ascertained from these trends. Looking back further, however (Figure 23), we have compared single family dwelling water use per dwelling for the 8 years before the drought that did cause 30% rationing in our service area in 1978 to the 8 years following rebound from that drought event and see a reduction of 7.8%. Of this, 2.6 percentage points or 33%, is known to be due to housing stock mix changes occurring during those years. More water efficient multiple units were coming on line at a greater rate than single family units during this period. So the best we can surmise at this time is that at least 5% of the downturn in unit residential use appears to be the result of conservation efforts. It may be more but we probably will not know for four or 5 years when California should have rebounded, to the extent it will, from the recent prolonged statewide drought.

Financial Impacts of Conservation

The investment we make in water conservation is $77,000 a year (Figure 24). That works out to be $5.11 per customer per year. Seventeen percent of that goes into research, 22% goes into soft conservation, and 61% goes into hardcore strategies. Where does it come from? Fifty percent of the budget comes from the connection fees (Figure 25). We are creating new capacity by conserving. Why not have connection fees pay for new growth's fair share? Forty-five percent comes from water sales revenues and 5% from grants. The net cost to our rate paying customers, therefore, amounts to $2.30 per year per customer.

Let's now look at our operating expenses versus operating revenues (Figure 26). We've had some problems. We religiously kept revenue above expenses until 1998, then you see we went into deficit. We have had a 1%, 7%, 14%, and then a $1 million deficit in each of 1992 and 1993, and now we are bringing it back under control through our rate increase program. We allowed this to happen on purpose. My board was unhappy with the amount of reserves the District was carrying and decided they needed to be reduced. Normally we would not allow those deficits to go above 1%.

Now here are our historic rate increases (Figure 27). Note that in the last 24 years, we have had 18 upward rate adjustments. I am actually proud of that record. Most utility managers might think that is a horrible record, but it is not; it shows the District closely tracked and reacted to cost increases. Let's look at how we actually measure up when you compare us against other agencies (Figure 28). If you take the sixteen big local area agencies that we normally compare with, we are 15% below their median cost even with all those rate increases. We have reacted to our conservation reductions, and we have reacted to our mistakes. If you do cash flow analysis every year and you make a mistake in one year, it is only one year old by the time you catch it.

How do we stack up against the Consumer Price Index for the San Francisco Bay Area (CPI) as a measure of the devaluation of the dollar? Going back to 1958, a single family detached home customer paid about $75 a year for water (Figure 29). That same customer today would be paying $377 a year for service considering inflation and the resulting devaluation of the dollar. In actuality that customer is paying only $244 a year for service. That's 35% less than the CPI. Of course as we grow we should beat the CPI because of economies of scale, but there are a lot of water utilities out there that are not doing so or at least not as well as North Marin has done.

Staffing levels have a very important impact on our financial picture. In the last 20 years our staffing level has remained virtually level at 50.4 full-time equivalent people (and it has not varied more than plus or minus three people from that); yet we have doubled the amount of services and we have taken on four more enterprise districts. More revealing is that the staffing ratio per thousand connections went from 4.5 full-time equivalents, to 2.9. That is a reduction of 30% (Figure 30). How did we accomplish that? Well, part was due to declining growth which reduced pressure on our construction/maintenance forces. By retraining and shifting jobs, staffing level was also helped. But part was accomplished by empowering employees, by making them responsible for what they do, equipping them with the tools they need to get the job done, and by standing beside them when mistakes were made.

Governing board stability is also important. I have a five-person board elected at large for four year staggered terms. I've had 12 directors in the last 22 years, and no incumbents that have stood for election have ever lost. The average service per director is 13 years, and the median service is 18 years. We get a fair amount of press exposure, so I conclude the public must be happy with us.

Key Lessons We've Learned About Implementing Effective Water Conservation

Summarizing the key lessons we've learned I would say:

- The top must buy off, and that's the manager and the board. If that doesn't happen you don't have a real conservation program.
- You have to respect your customers needs in everything you do; avoid rate shock; preserve choice; and interfere as little as possible in the customers' enjoyment and use of water.
- Know how your customers use water, and then you can do sensible things. If you don't know how they use water you are going to do dumb things, like implementing harsh escalating rate structures, many of which don't make any sense given the relative inelasticity of the price of water.
- A volunteer approach is better than a regulatory approach when implementing a conservation strategy. For a volunteer approach to work, you have to really think it out. It preserves choice and diversity, it is less intrusive, and it is more equitable.
- Implementing a successful volunteer strategy requires more thought and work but the customer participation rates are usually better and therefore the unit cost per gallon saved is less.
- A large conservation staff is not required. Look for opportunities to use competent student help and community volunteers.
- Opt for media stories versus slick ads. People read stories, but they don't read ads.
- If you must buy an ad, co-op it. There is always someone out there you can bring in on the ad to help pay for it.
- Whenever you do ads, be different. "Original plain" is a lot better than "colorful slick."

- Preserve and limit your bill stuffers. Some of the utilities here have probably already blown that. We allow only two bill stuffers a year at North Marin: one for the annual water quality report to our customers and the other for a water conservation offer (usually a rebate offer).

- Think "incremental and quality."

- Track costs carefully and frequently, and react aggressively.

- Lastly, but not least, you have to know if what you did worked and how well it worked. You can only do that by investing in research.

Good luck with your conservation program. I hope our experiences will be of benefit to you.* * *

* * *

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Seasonal Rainfall at Stafford Lake

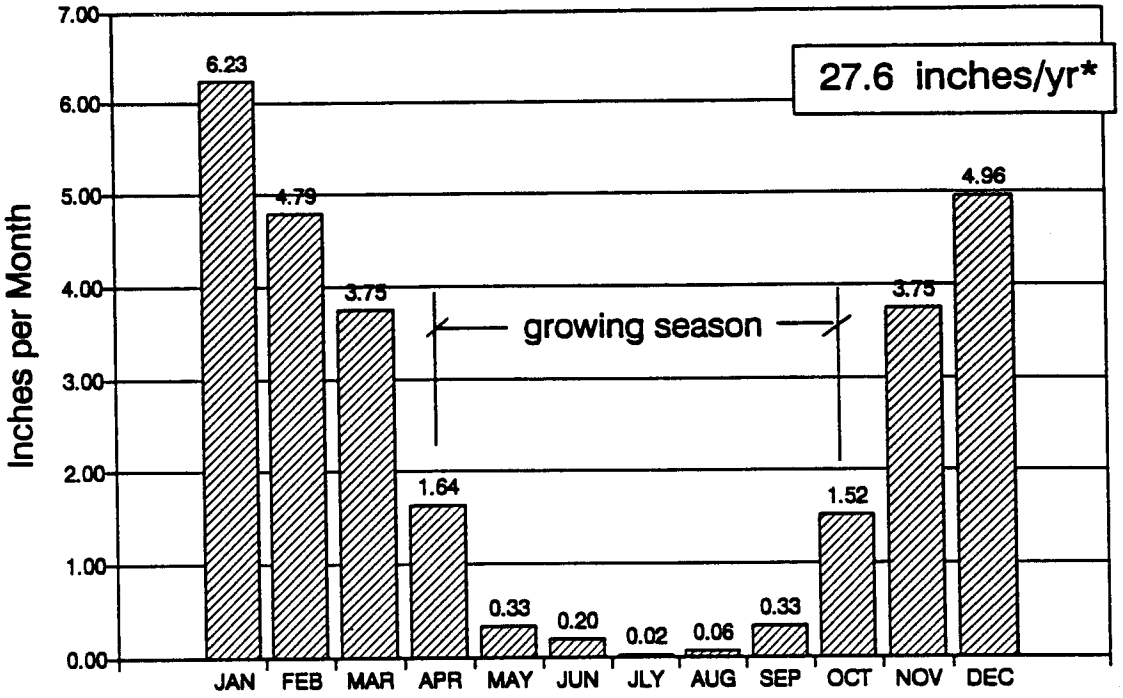


Figure 1

Seasonal ETo - Novato CIMIS Station #63

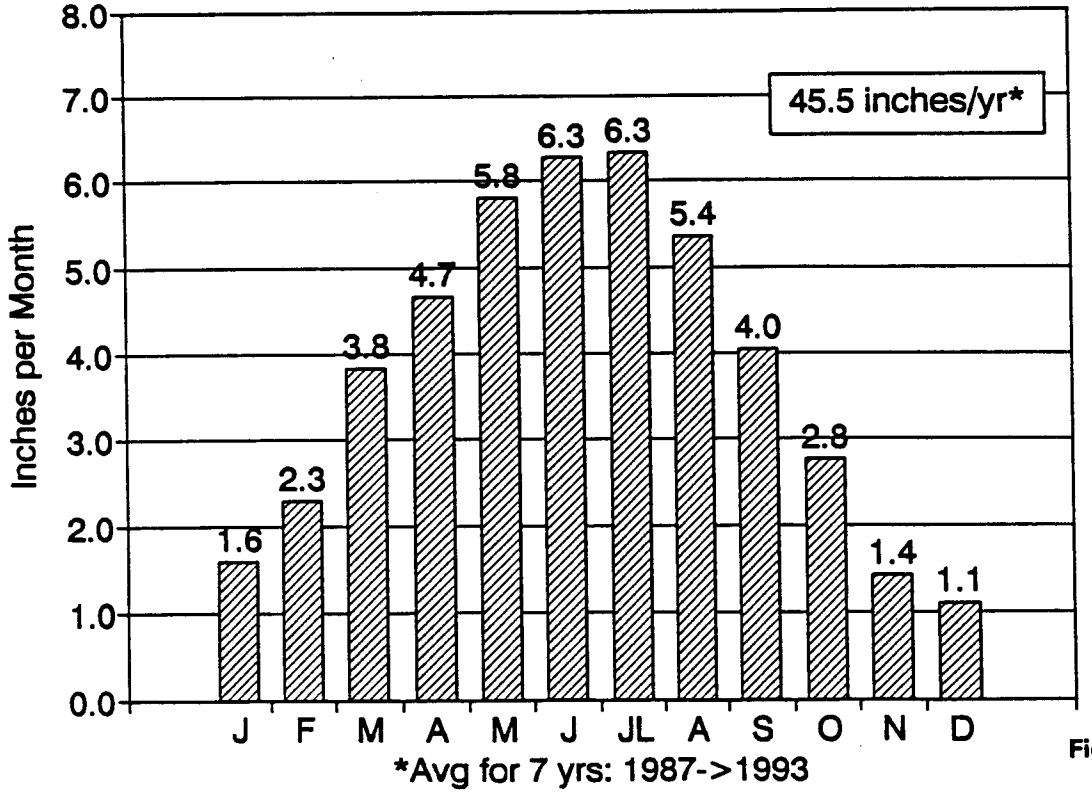


Figure 2

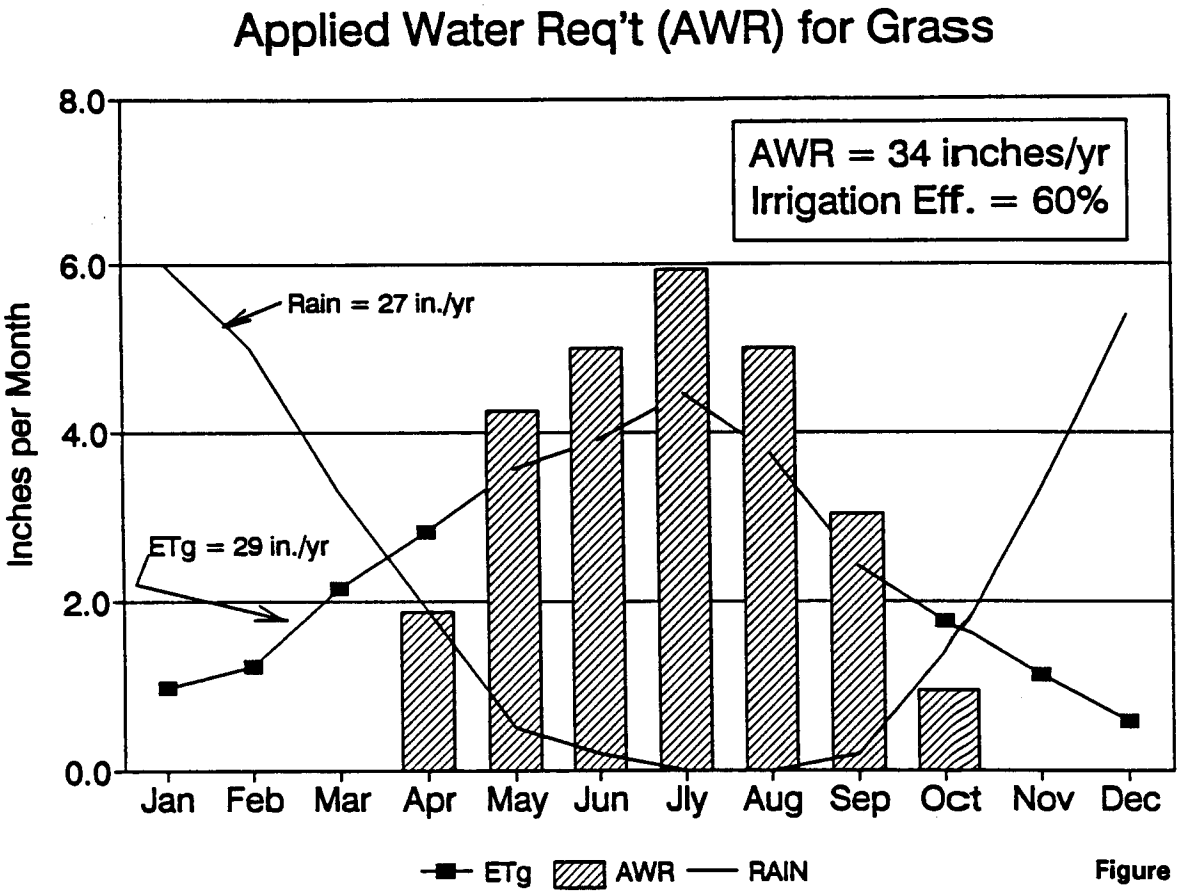


Figure 3

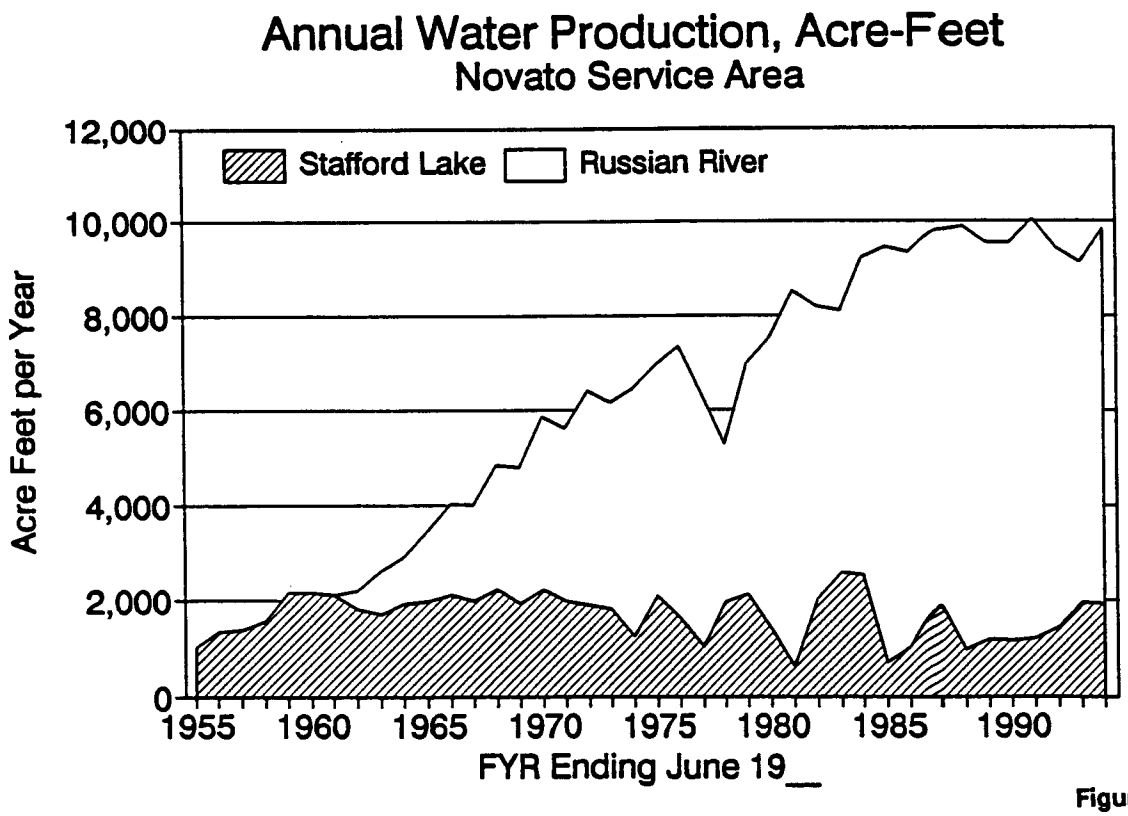


Figure 4

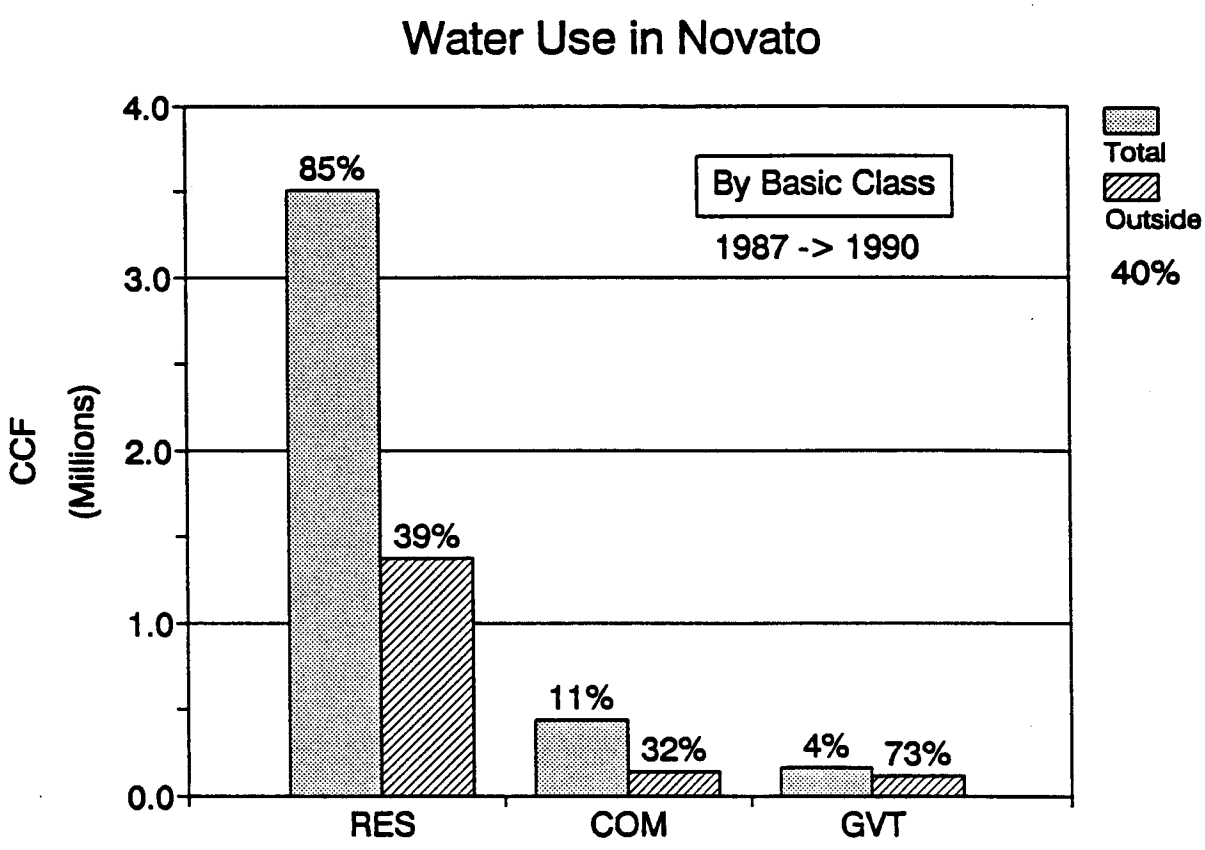


Figure 5

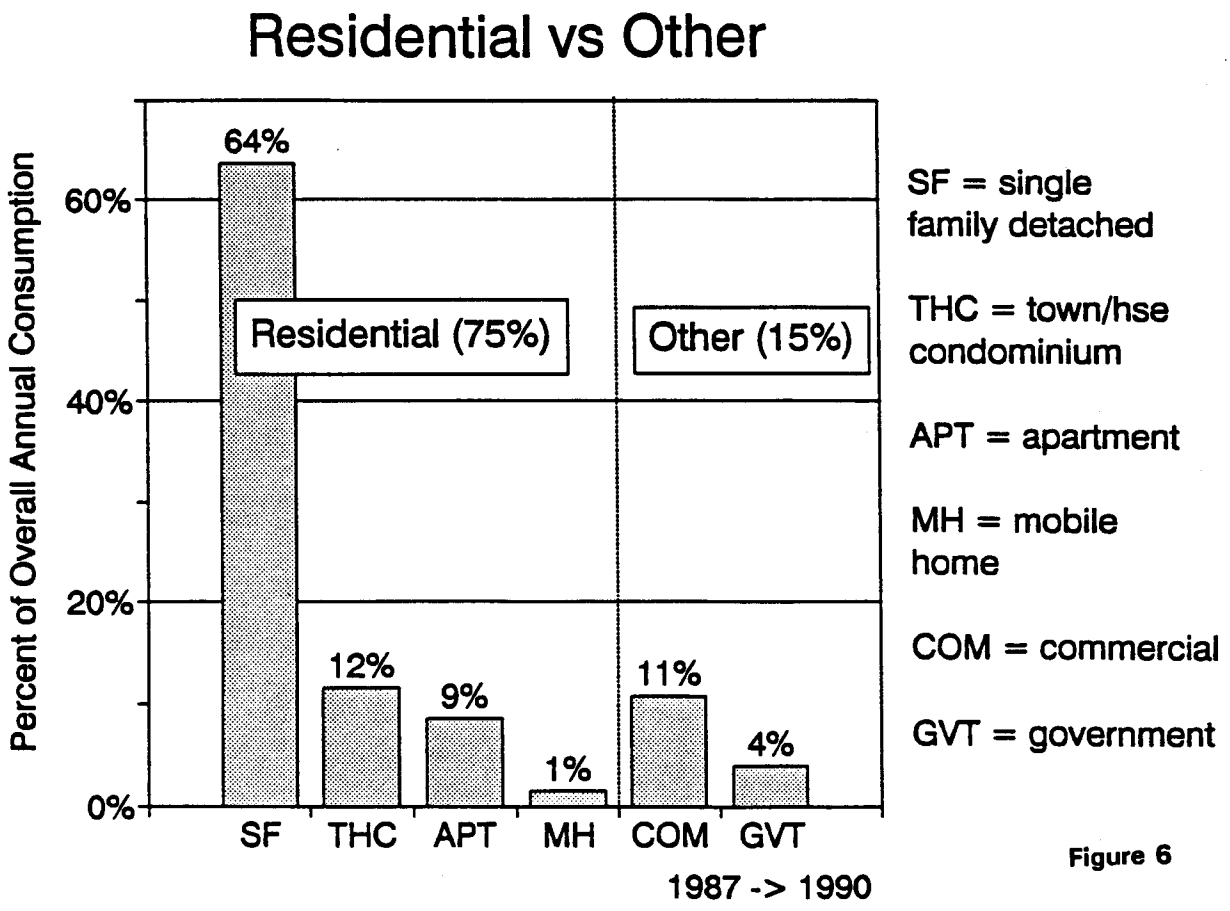


Figure 6

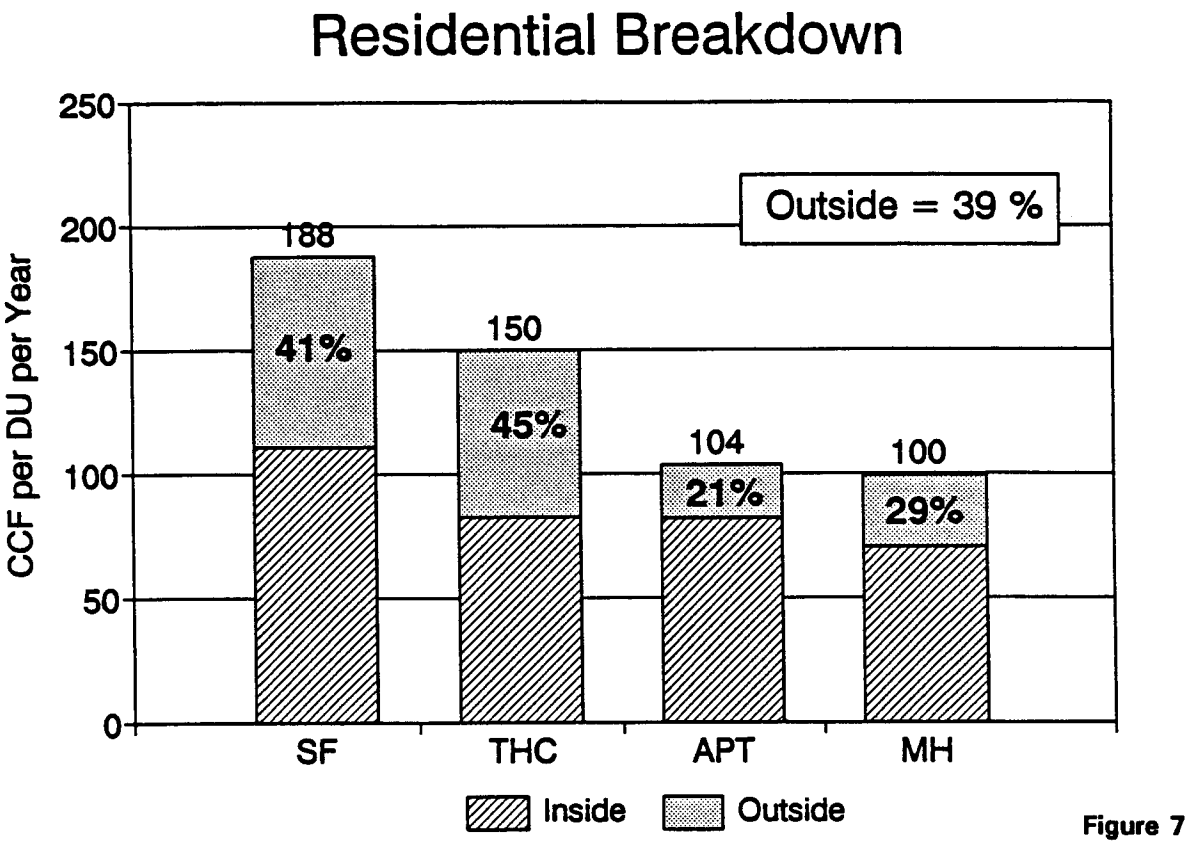


Figure 7

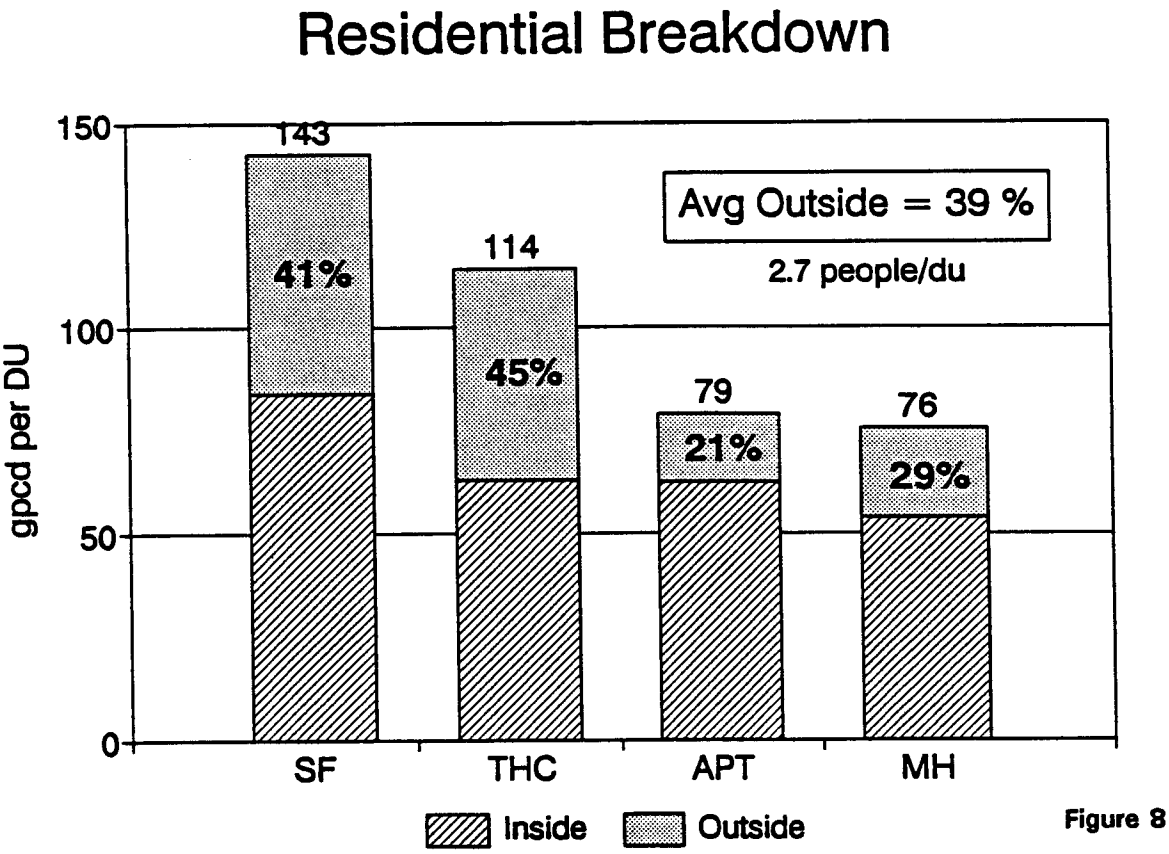


Figure 8

Where the Action Is - SF Water Use

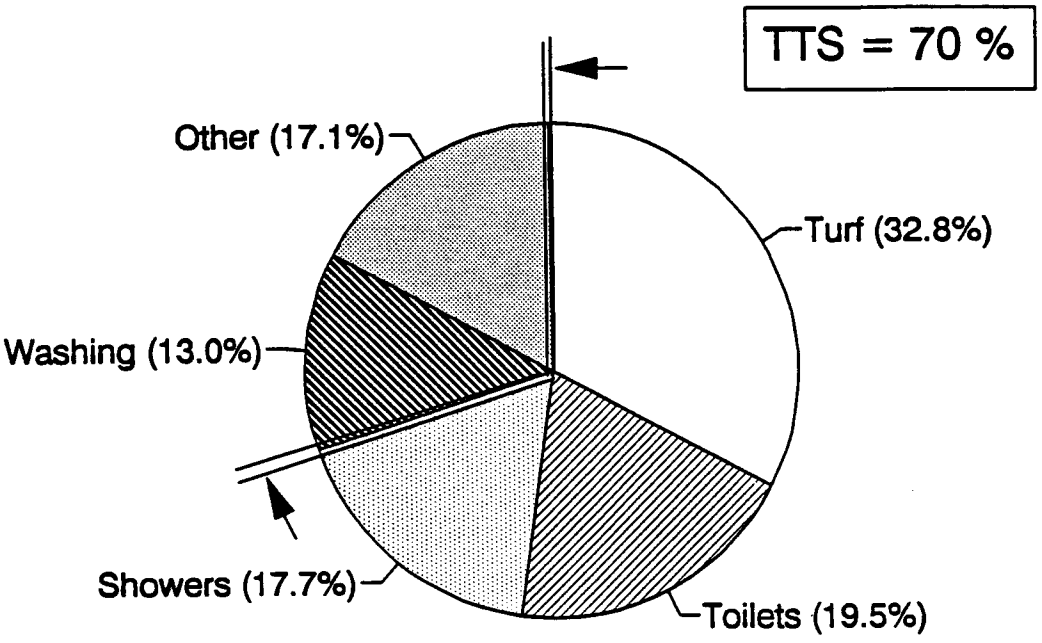


Figure 9

Peaking Ratio Trend

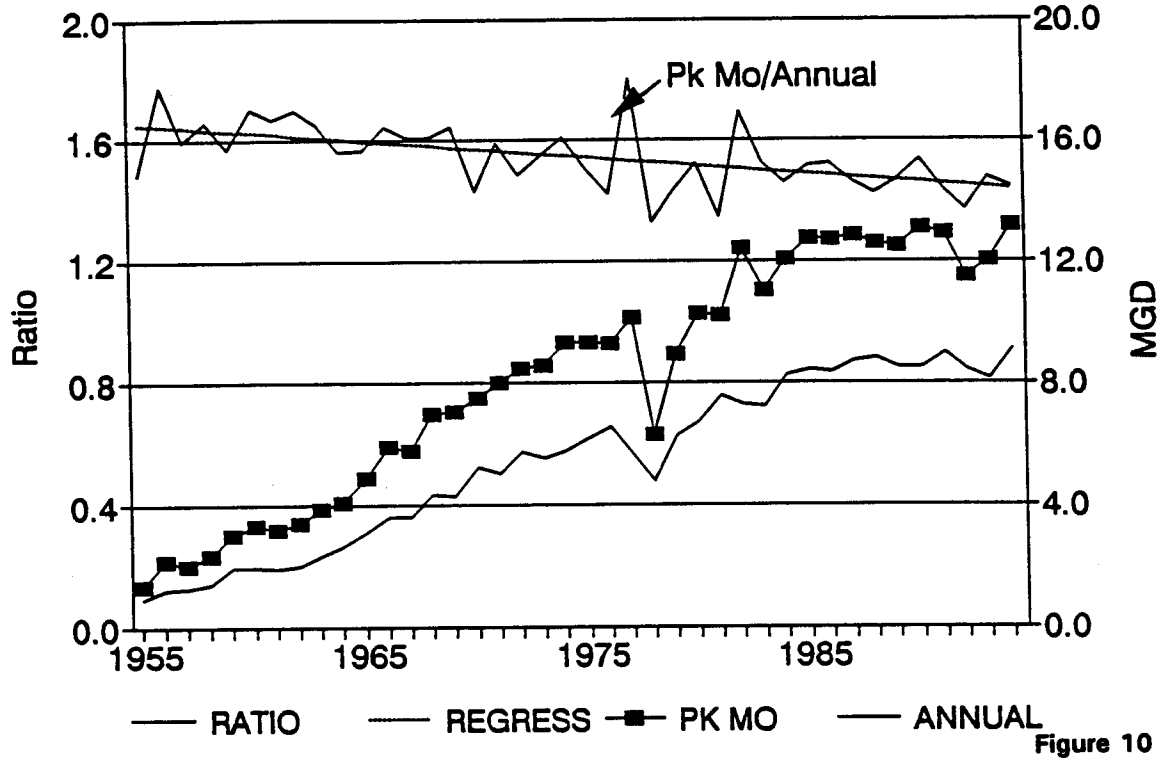


Figure 10

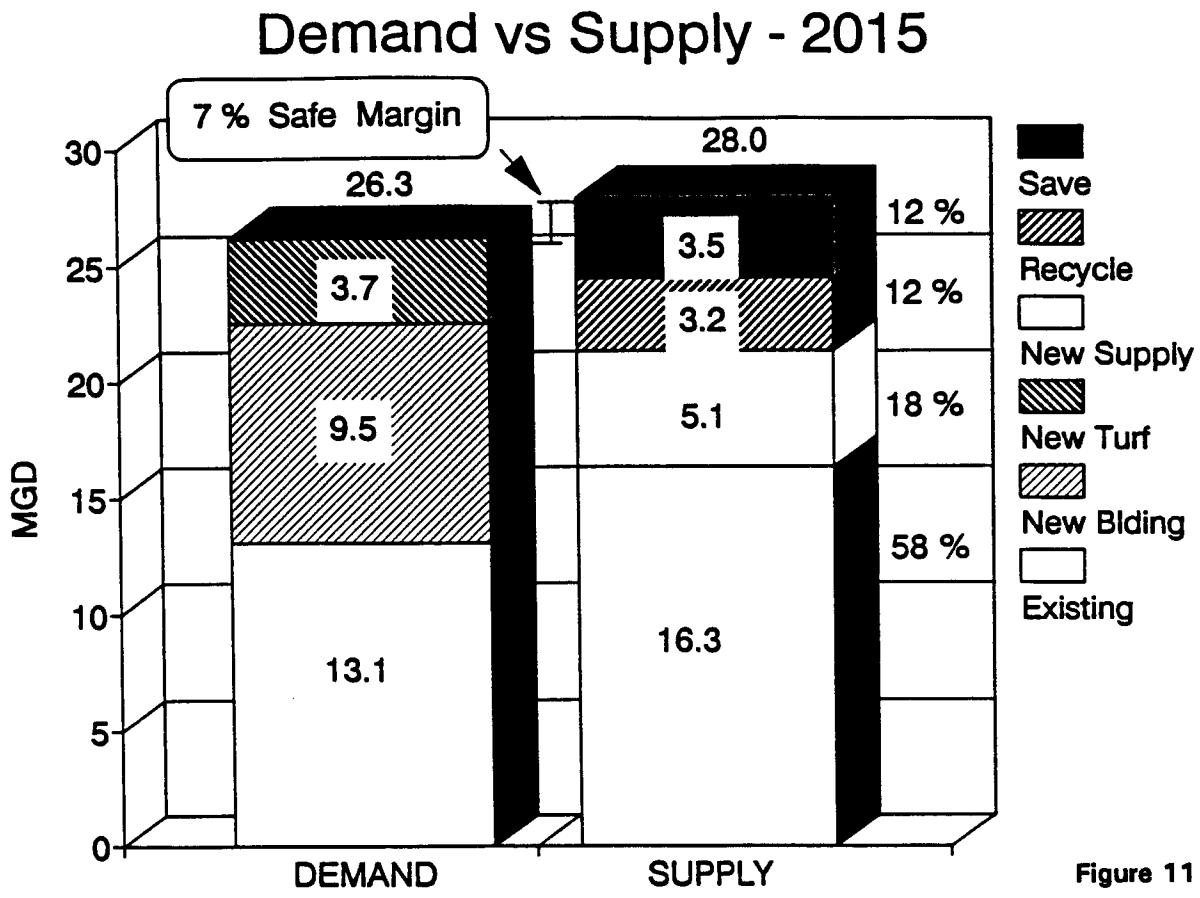


Figure 11

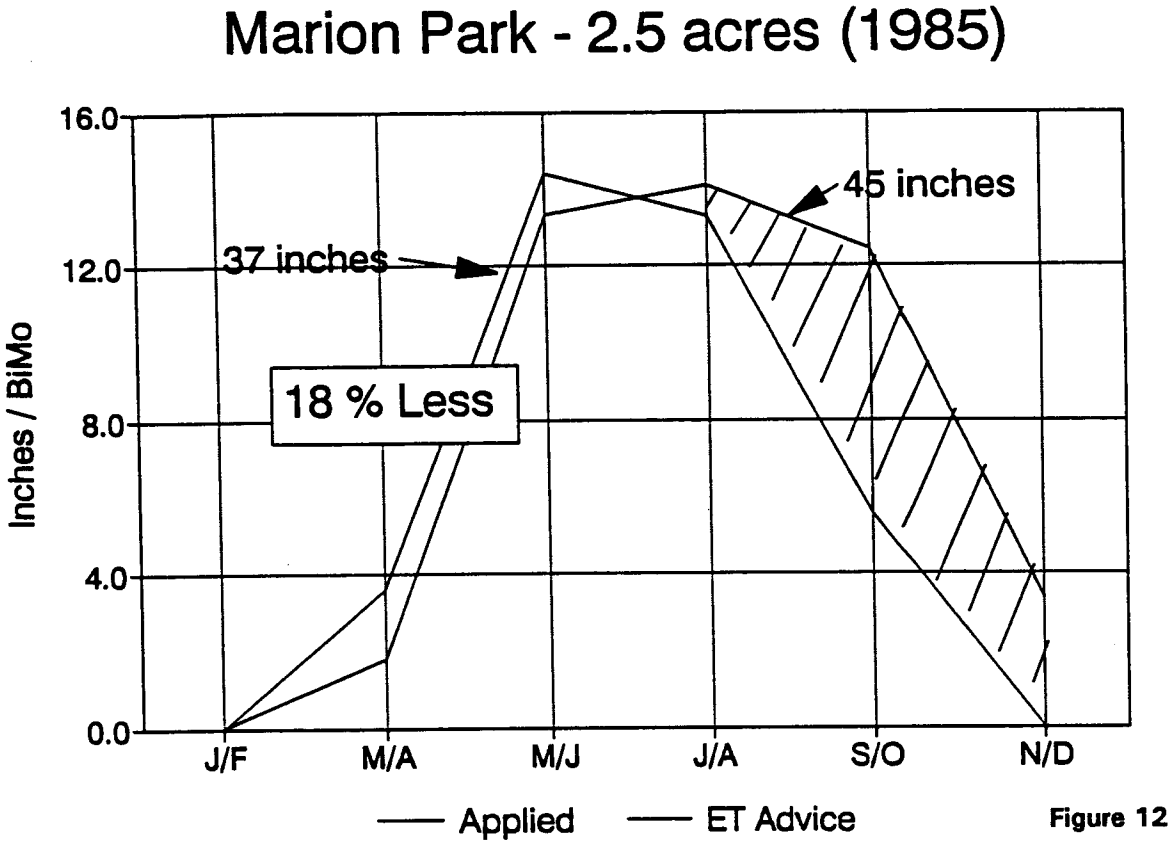


Figure 12

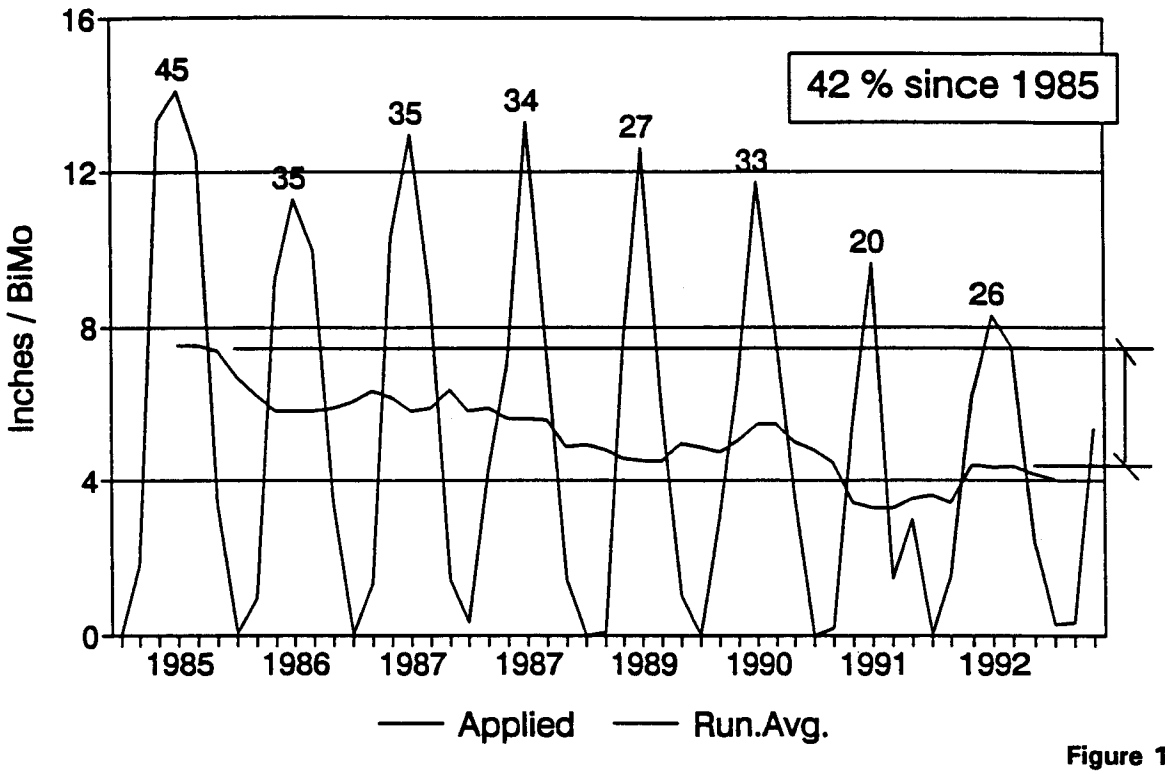


Figure 13

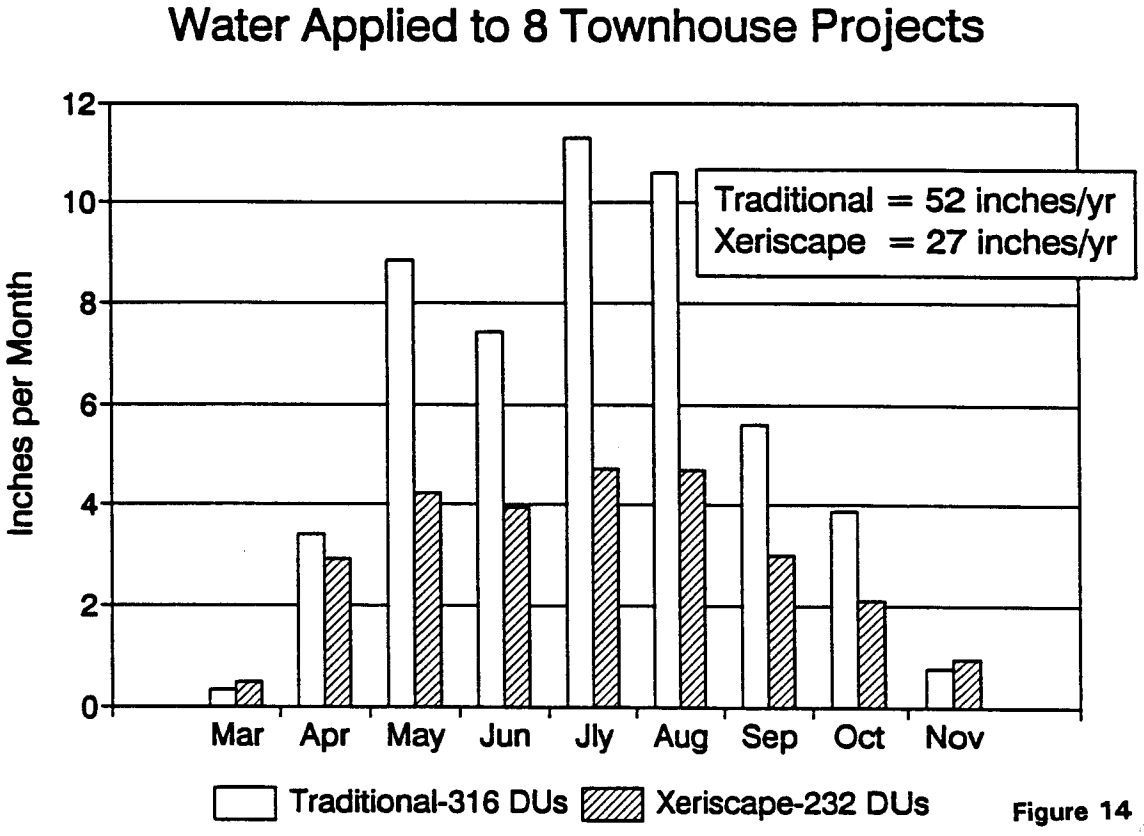


Figure 14

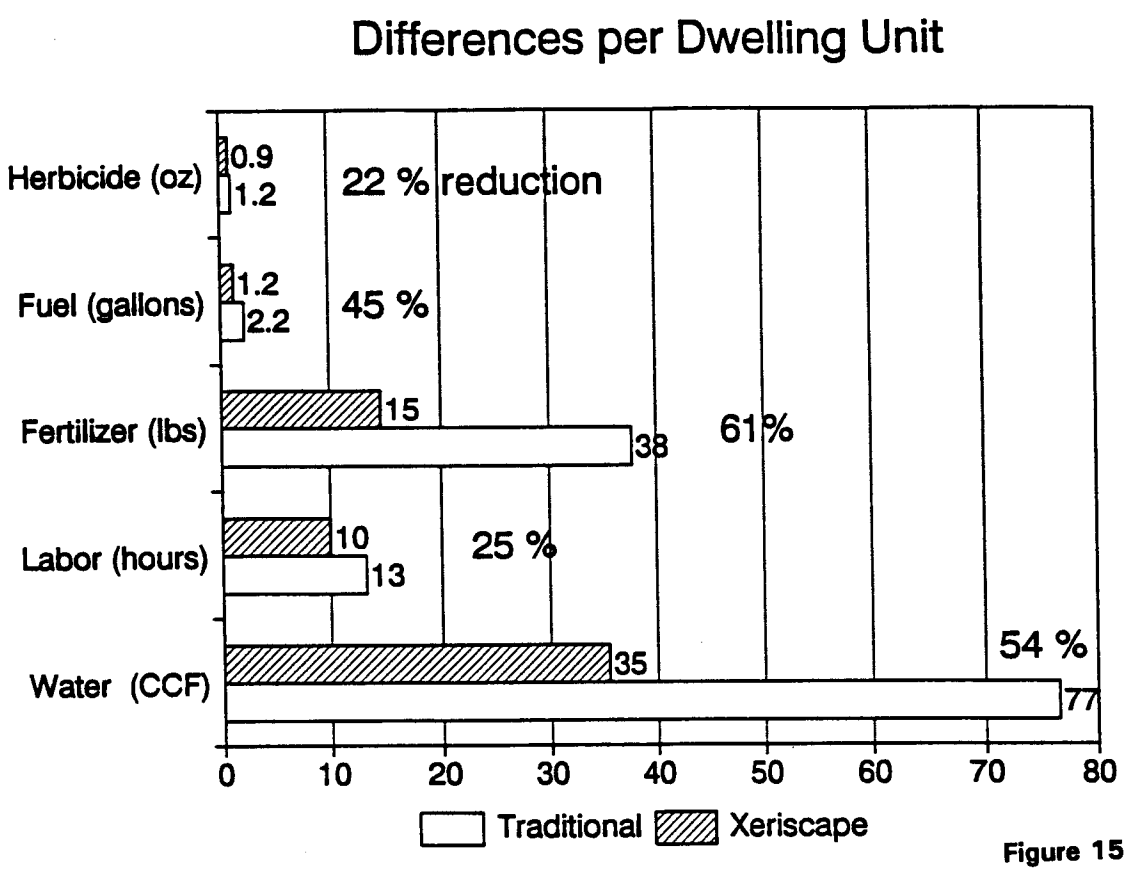


Figure 15

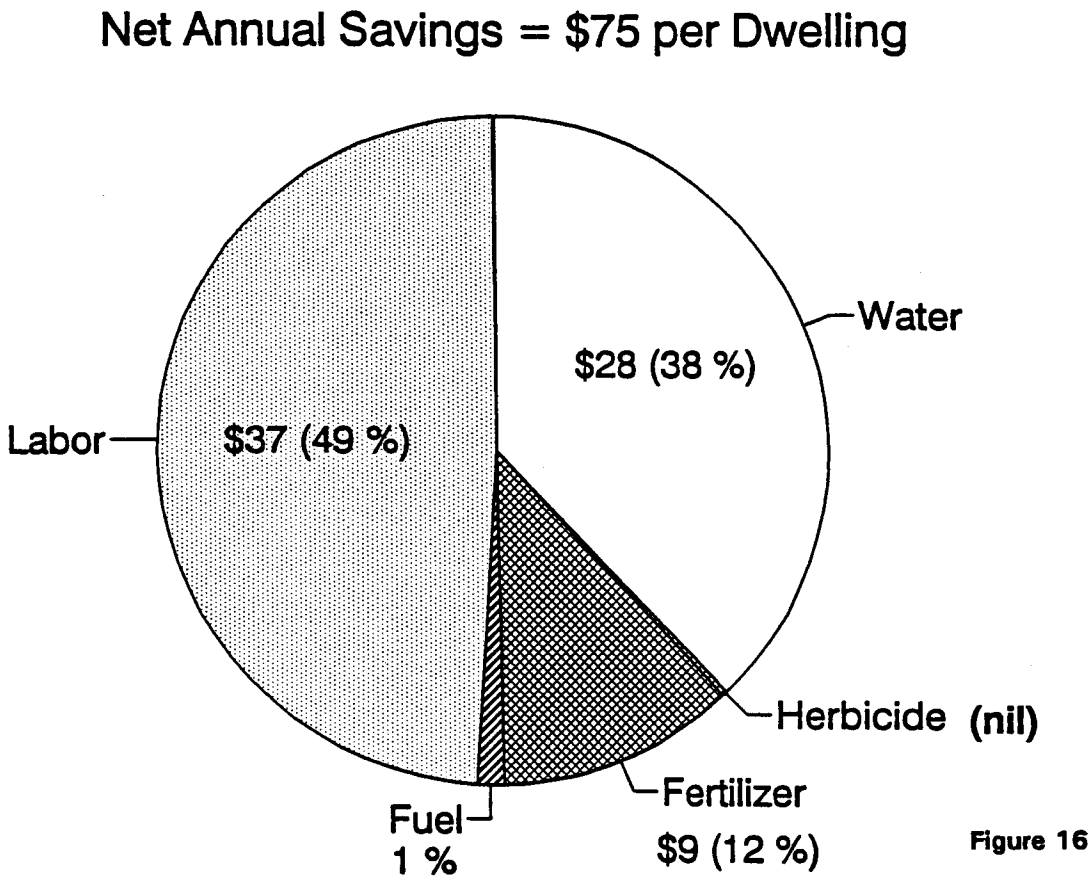


Figure 16

Turf Goals, sq-ft per DU

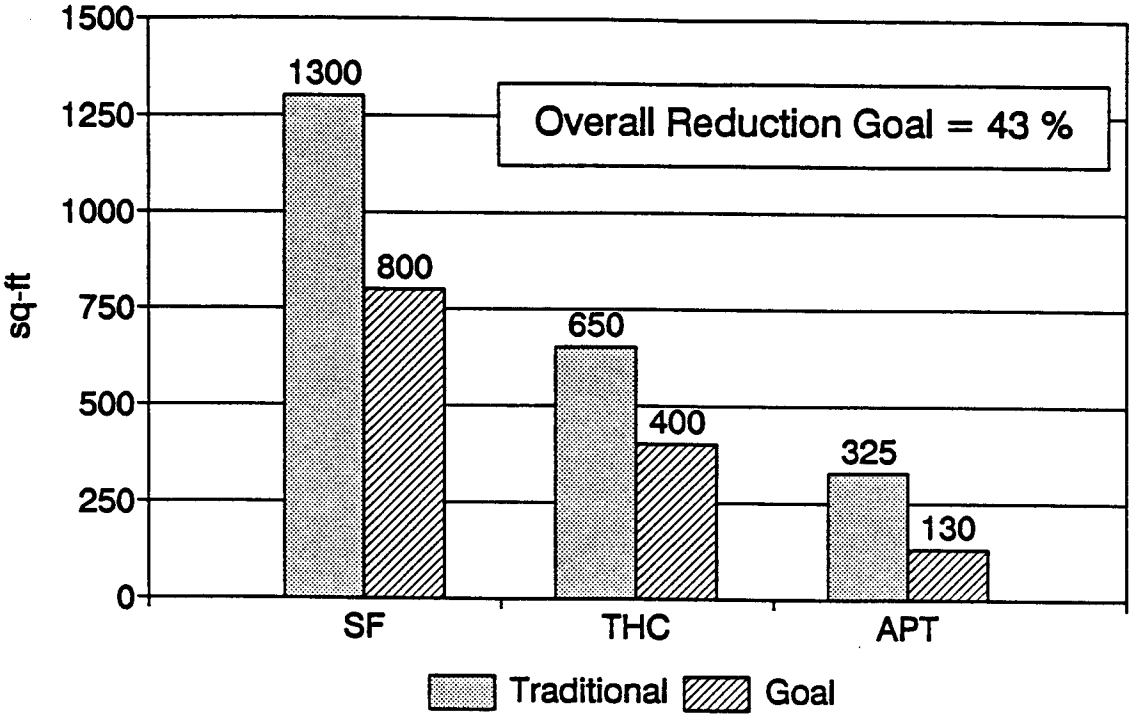
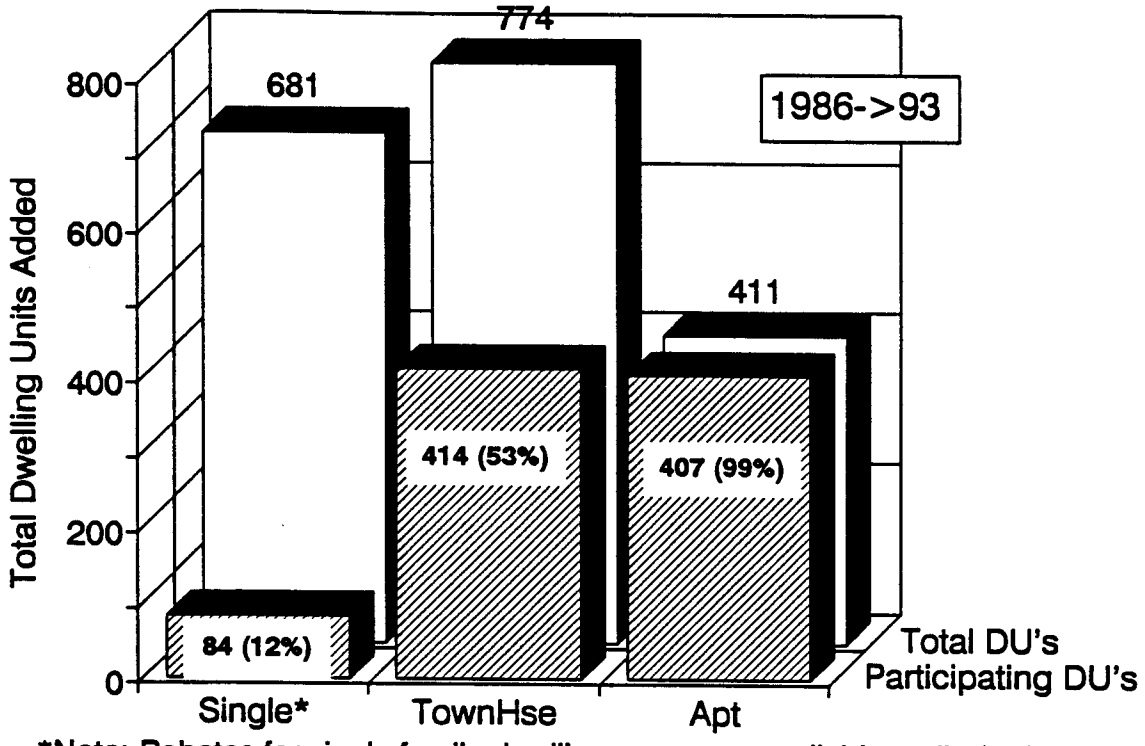


Figure 17

Participation In Cash for Grass Program

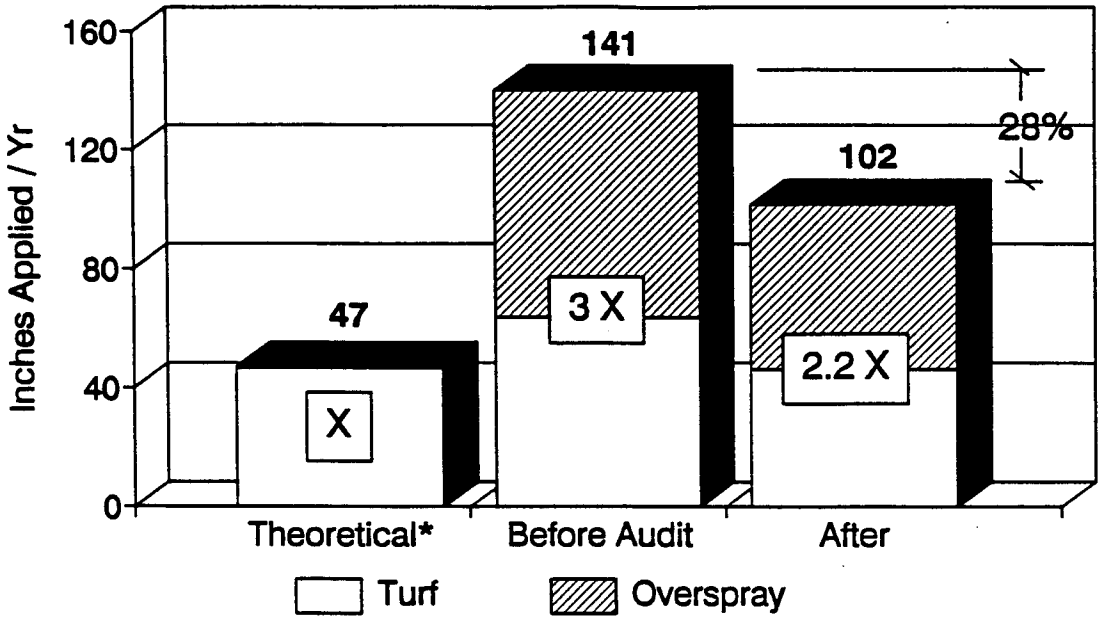


*Note: Rebates for single family dwellings were not available until 3/17/92

Figure 18

Parking Lot "Turfscape"

(8900 sq-ft, 6 to 12 ft wide)



* uniformity coef. = 44%

Figure 19

Historic Demand - Novato

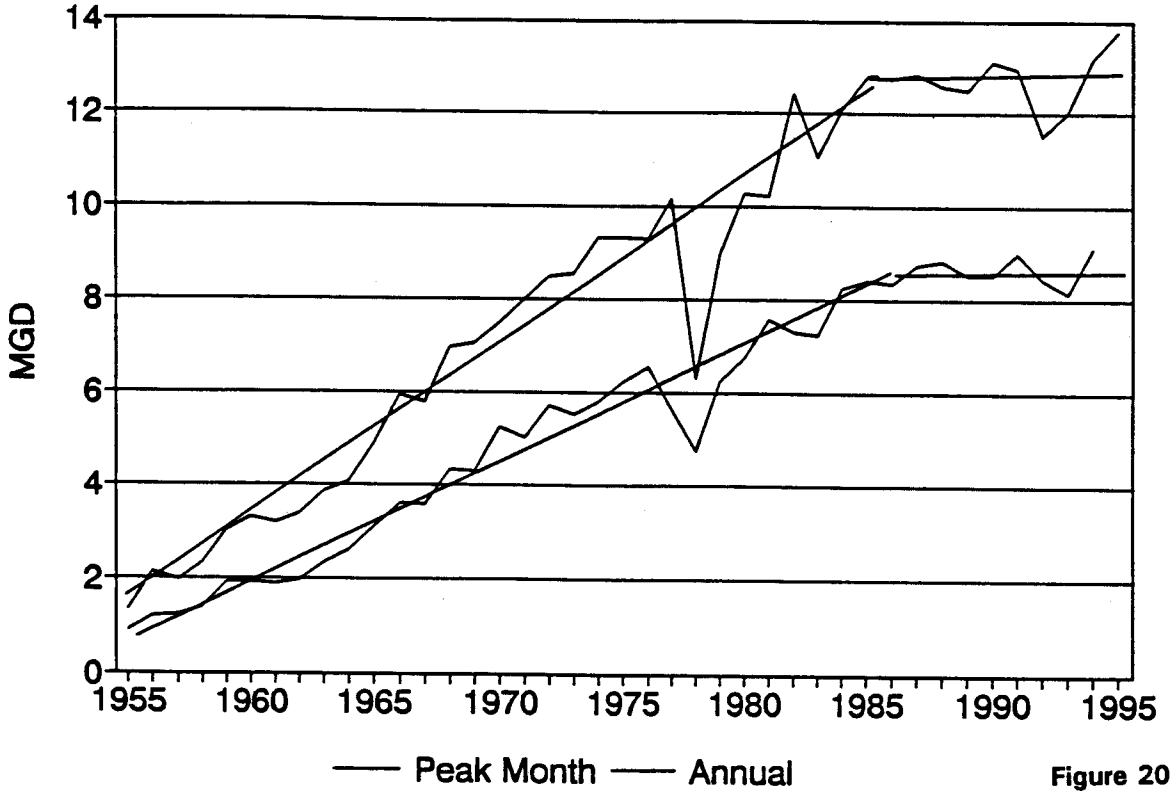


Figure 20

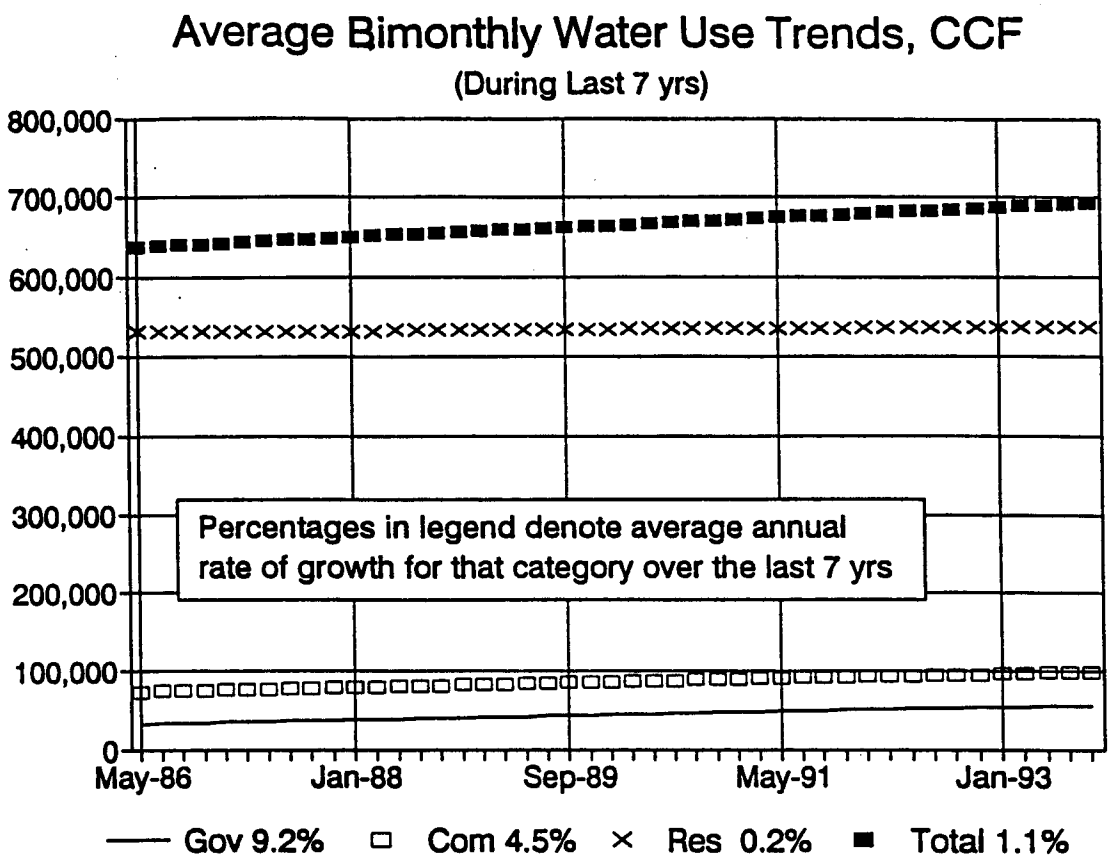


Figure 21

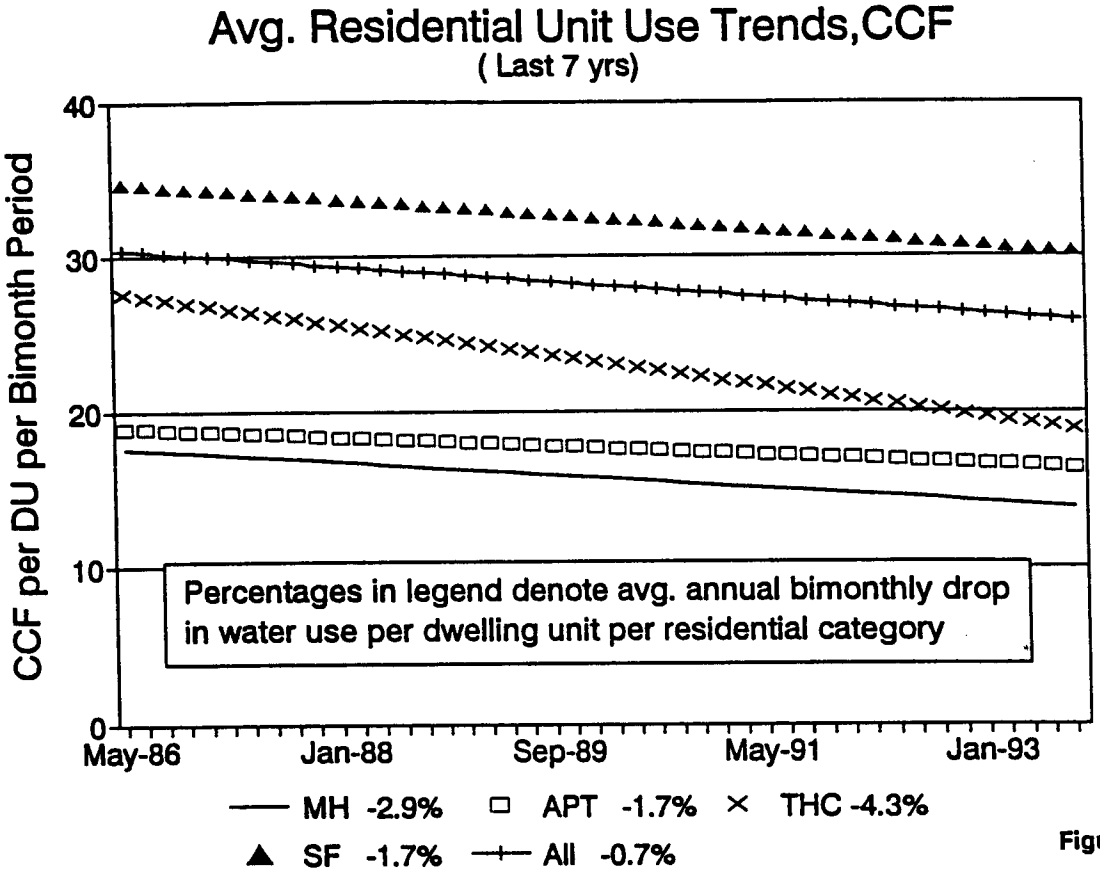
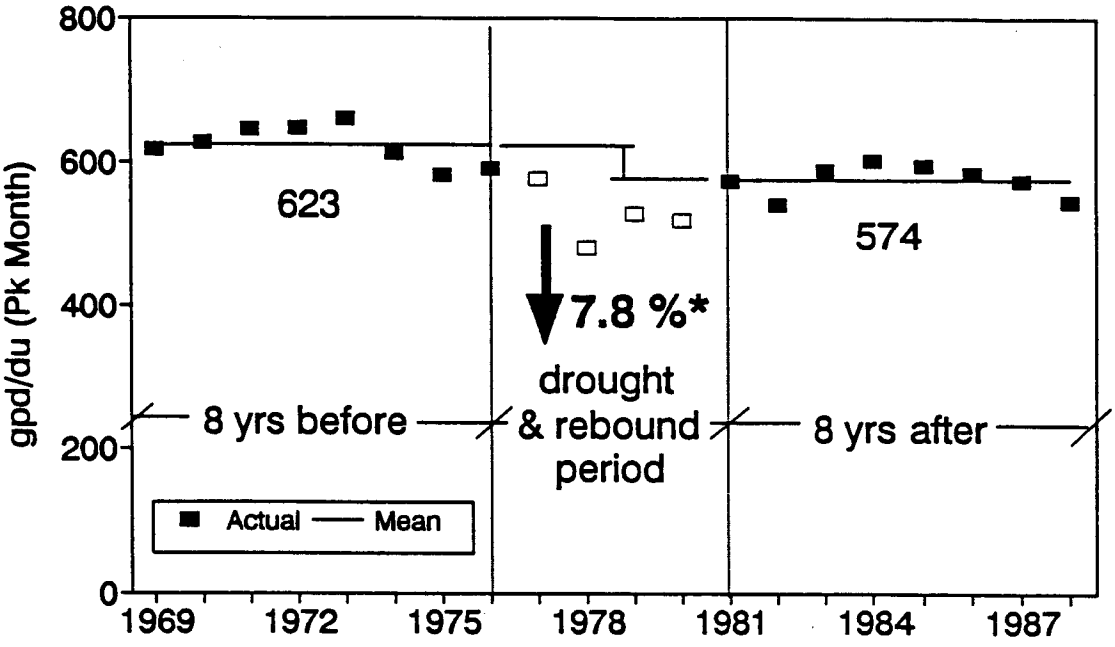


Figure 22

Water Use per SF Dwelling



* 2.6 % is due to housing stock mix change

Figure 23

Cost of Water Conservation

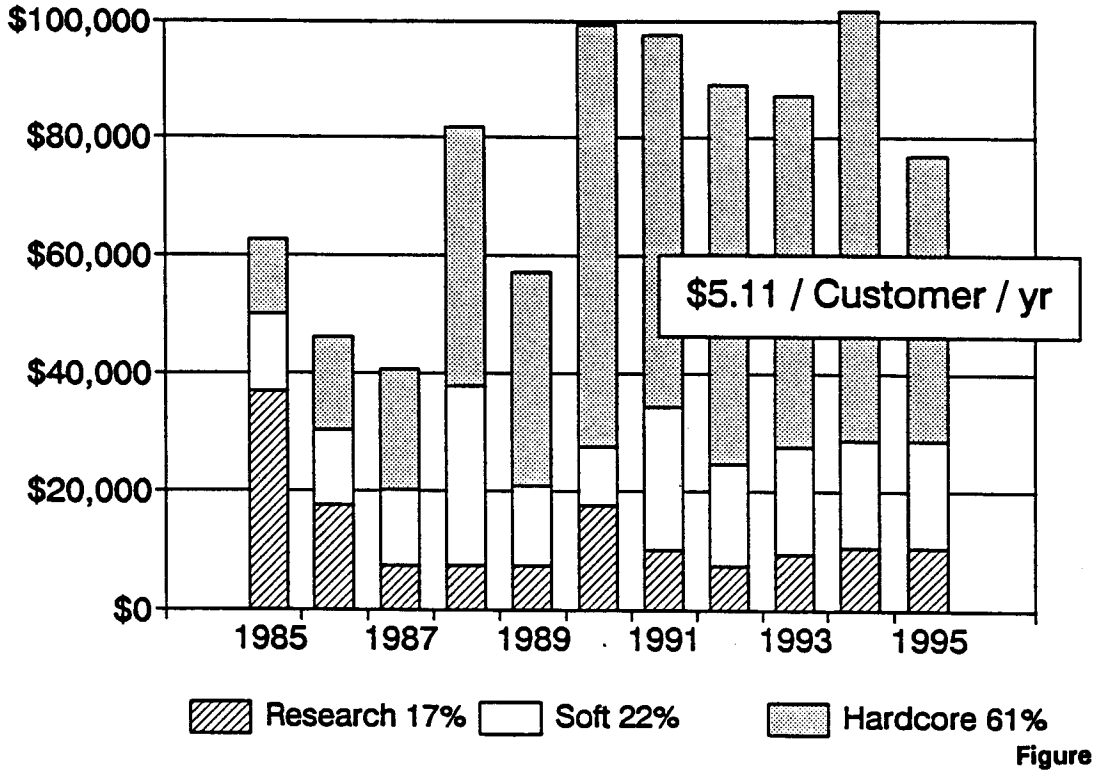


Figure 24

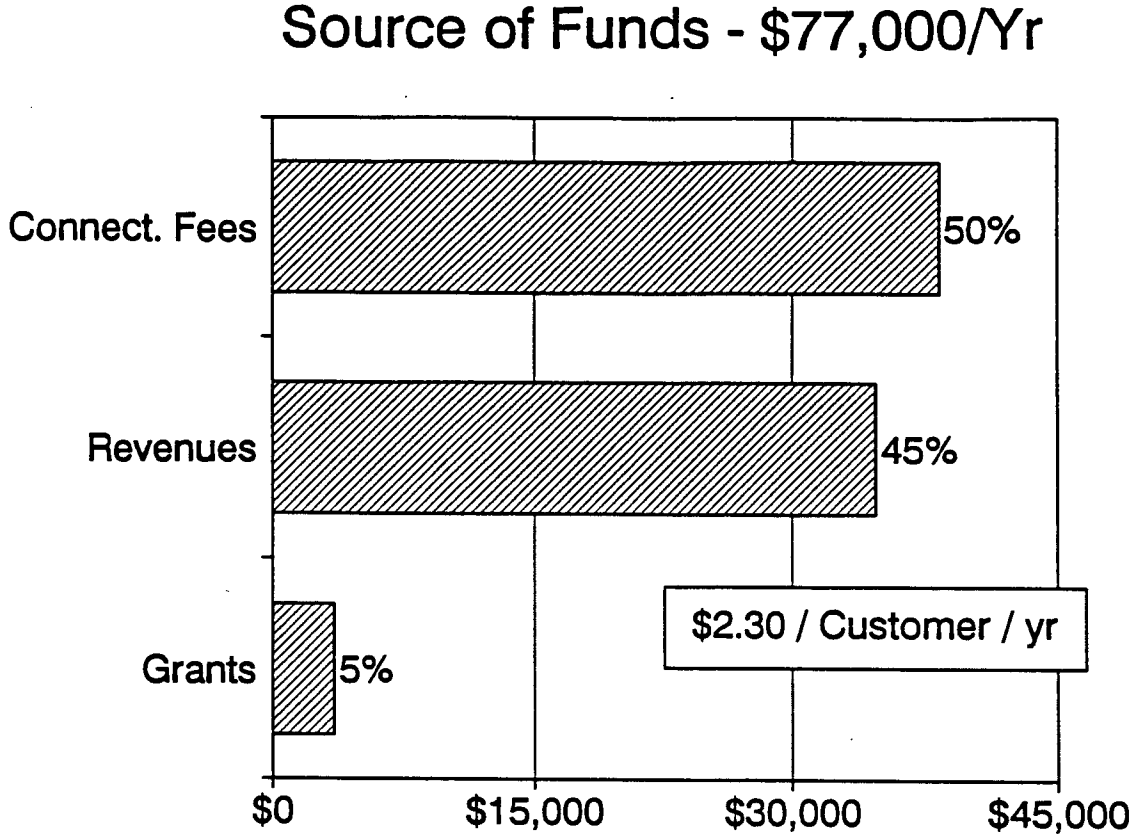


Figure 25

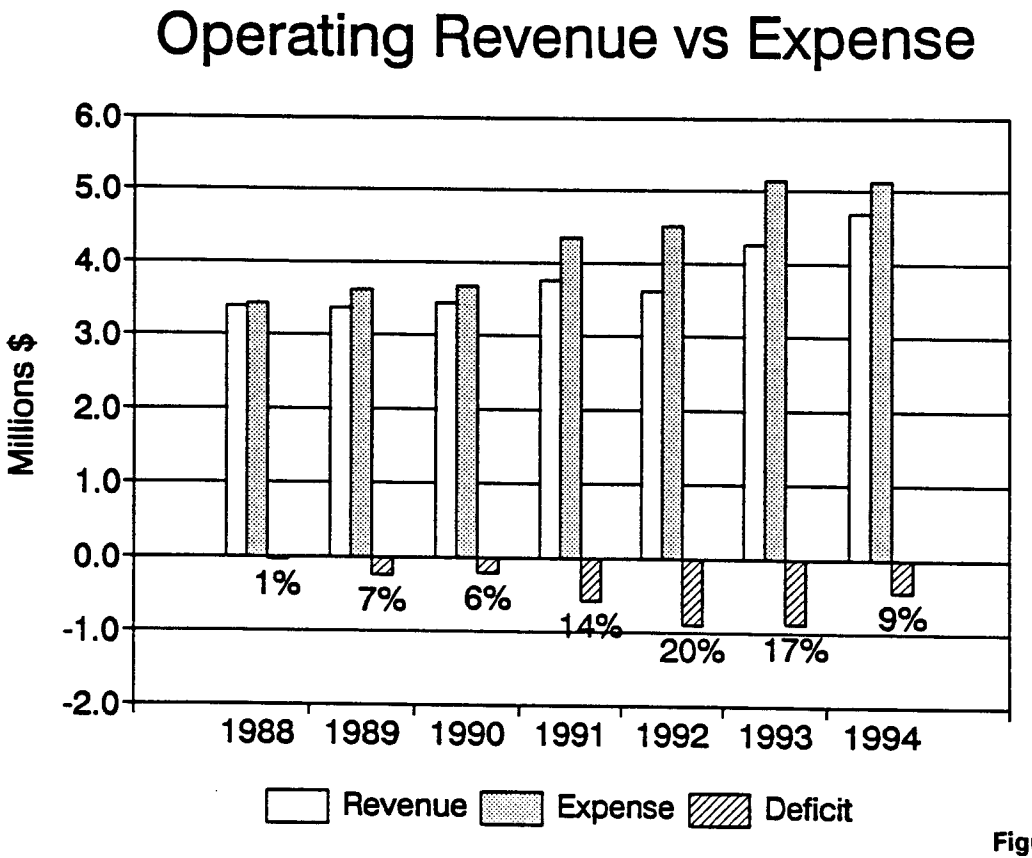


Figure 26

Rate Increases*

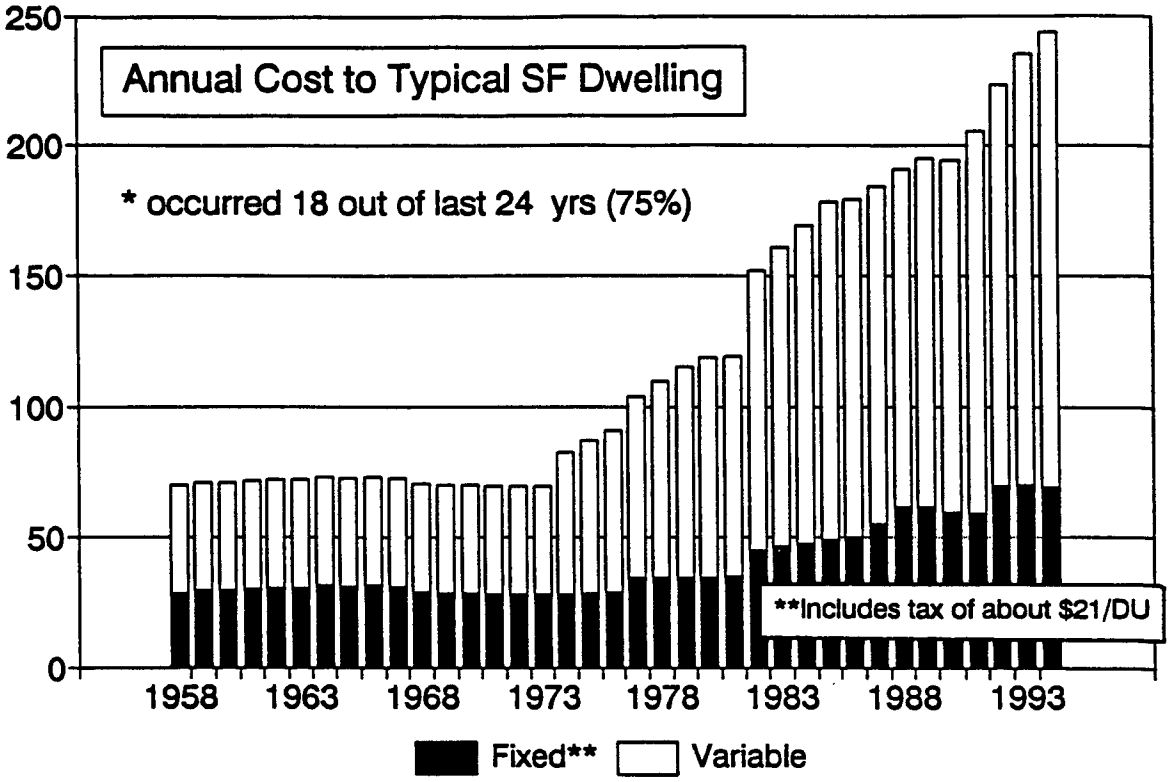


Figure 27

How We Compare

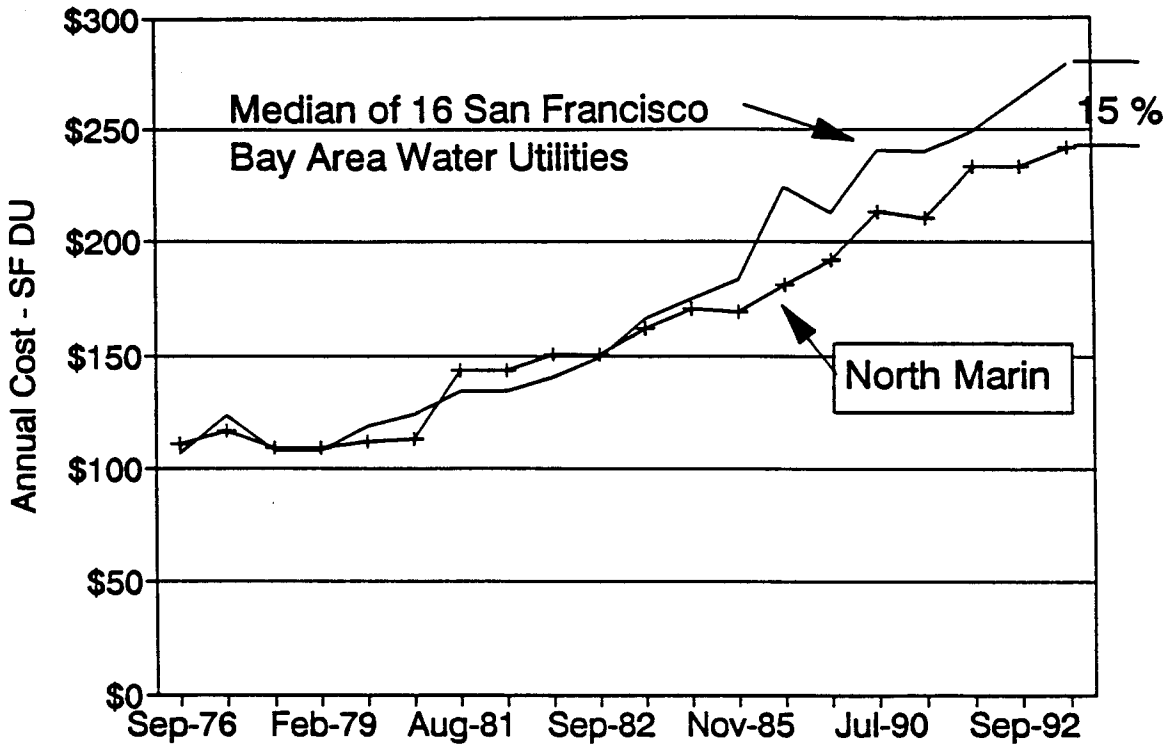


Figure 28

Cost of Service vs. CPI

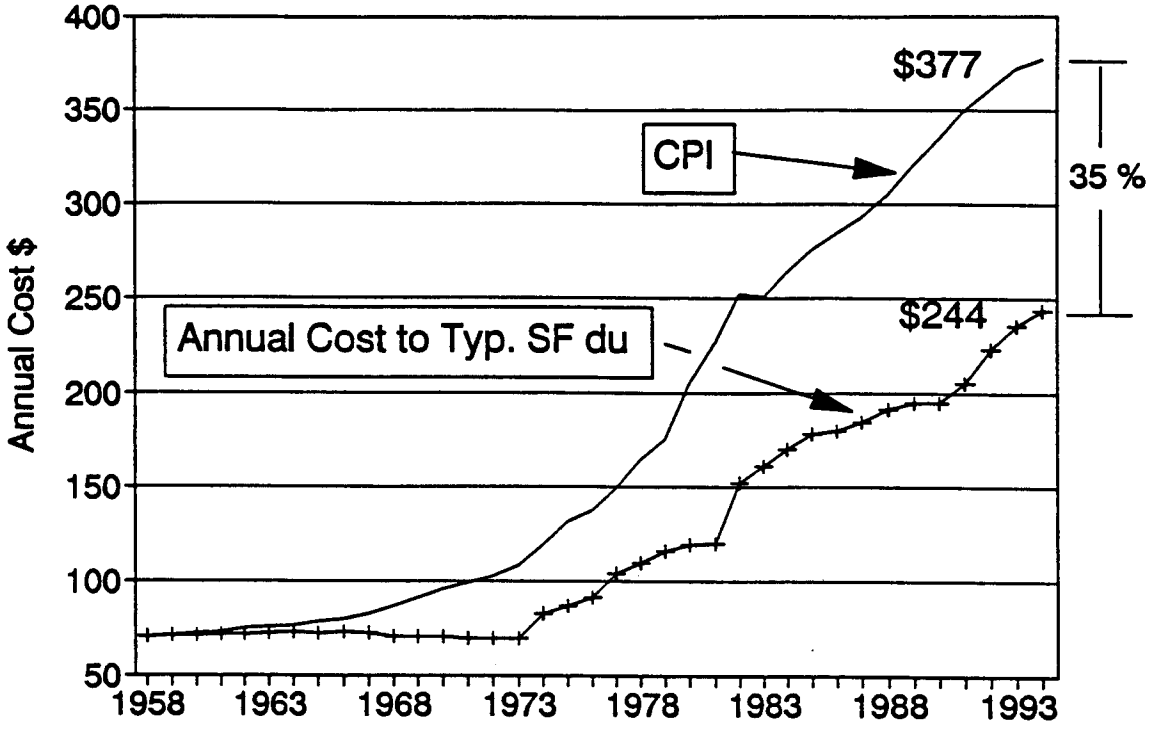


Figure 29

Staffing Levels

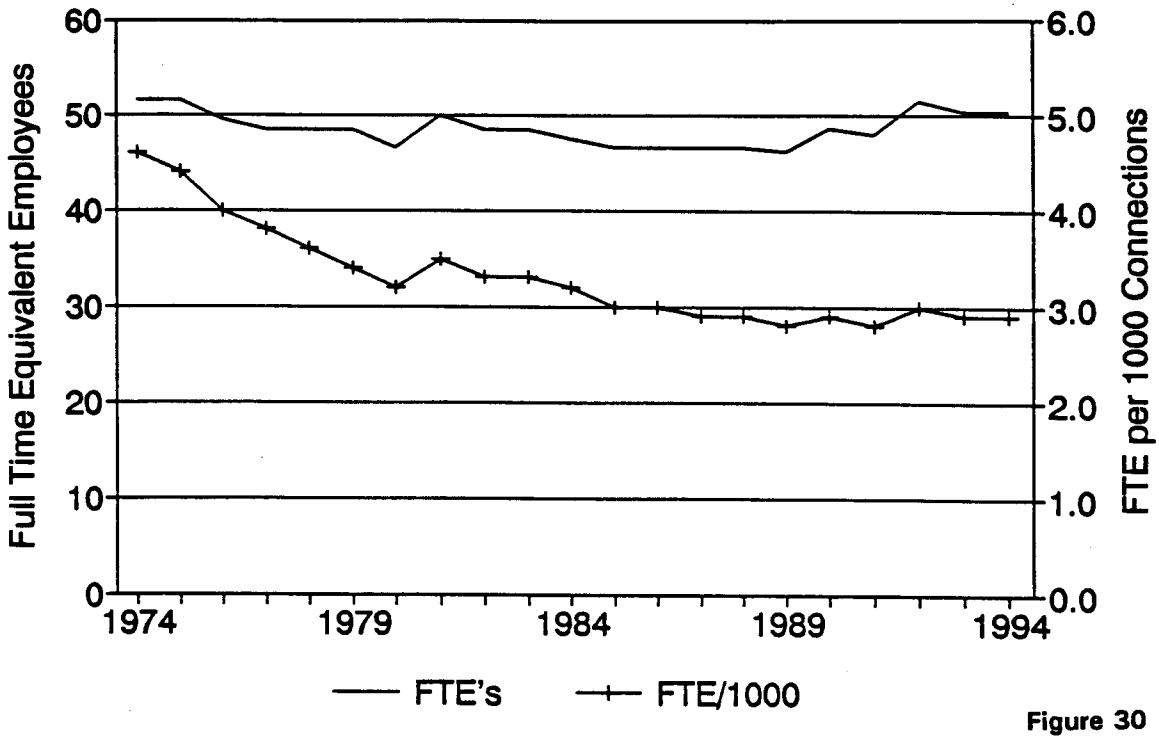


Figure 30

The Limits of Conservation in Meeting Municipal Needs

Angela Montoya

Senior Analyst, Denver Water Department

What I'm going to talk about today is the limitation of conservation in meeting municipal needs in the areas of water supply, water use, facilities planning, and customers. I have to begin by giving a disclaimer that these views do not represent Denver Water's views on conservation, nor any of my close family members' views on conservation.

Water Supply

Three common messages sent about the impact of conservation on water supply include: conservation can 1) extend available water resources, 2) defer the need for supply expansion, and 3) increase supply options. One of the messages we don't send is, "With conservation we will never have to build another source of supply project." While this may be obvious to those of us in the industry, it is not obvious to other interested parties and customers.

Another message we don't send is, "With conservation, it is more challenging to predict the timing of future supply needs." Let me try to explain.

Graph No. 1 shows Denver Water's long-term supply and demand curves. The flat line represents existing supply projected from 1980 through the build-out of the system which is 2035. The other two lines represent what the projected demand is, and what the theoretical demand is if there was no additional conservation. These two lines cross the existing supply curve at different places. The projected demand with conservation extends the planning horizon for the next supply project out ten or twenty years. With a longer planning horizon comes more uncertainty: will the existing level of conservation prevail; can we withstand a drought until the next supply project, etc.

Water Use

Three common messages sent about the impact of conservation on water use include that it (1) promotes efficient water use, (2) helps to reduce total annual demand, and (3) helps to reduce peak demand. One of the things conservation has not done is increase revenue stability. This is a message we have not sent, but are beginning to understand.

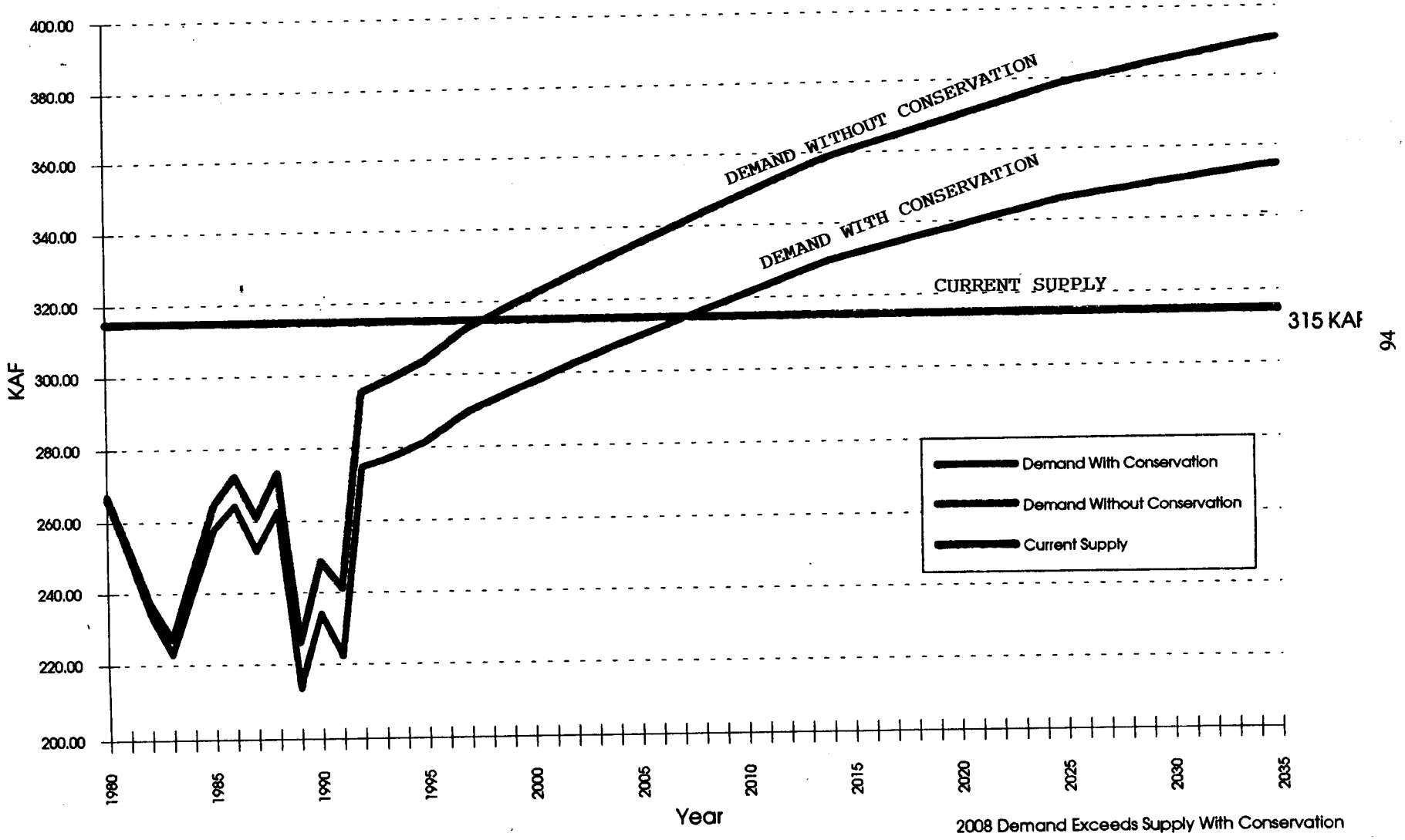
To illustrate the kind of revenue instability I am talking about, Graph No. 2 shows inside residential consumption in 1986 at 25 billion gallons. After two of the major conservation programs were implemented, the metering program and a change in the rate structure to inclining block, you can see that residential consumption fell roughly 32 percent between 1986 and 1993. That includes growth in new accounts. If you look at that same data in gallons per account per day (GAD) per customer, what you see is that the GAD fell from 600 GAD to 400 GAD in 1993 (Graph No. 3). This is a dramatic impact, not only in terms of consumption, but in terms of revenues.

Another message we don't send is that extensive conservation measures may lead to demand hardening over time. This simply means that the more structural changes that are made, with retrofitting and landscaping, the less additional conservation there is to squeeze out of the system during a drought.

Facilities

One of the messages we hear about conservation is how it can positively impact our facilities. For example, it can extend the useful life of the facility or lower peak costs. Conservation cannot, however, completely eliminate seasonal demands on those facilities. This means that costs, at least in the short term, may not fall. Facilities that are sized to meet higher peaks still have fixed costs associated with them whether or not they are fully utilized.

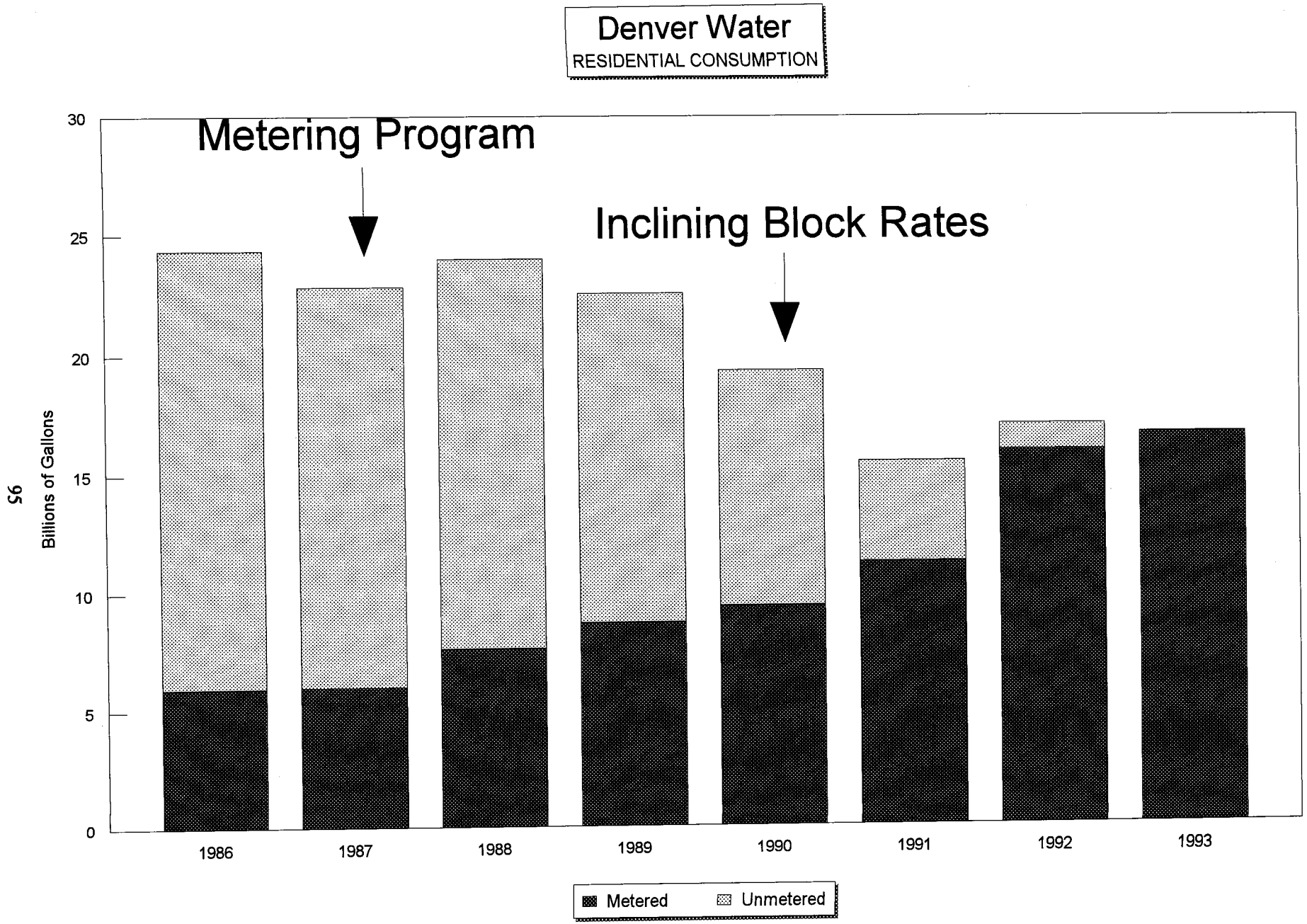
Net Demand and Unconstrained Demand



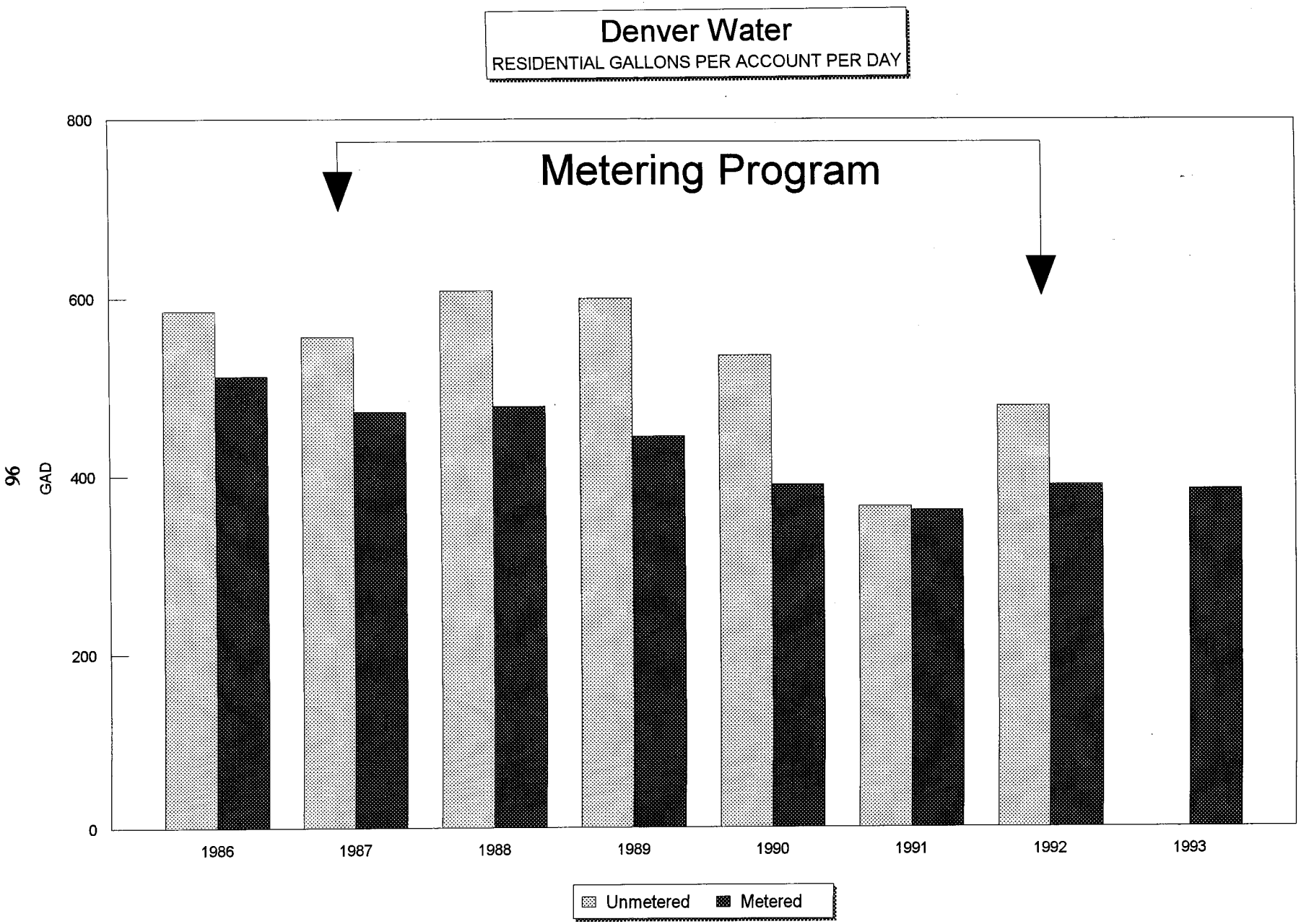
2008 Demand Exceeds Supply With Conservation

1998 Demand Exceeds Supply Without Conservation

Graph No. 1


Denver Water
RESIDENTIAL CONSUMPTION
Metering Program
Inclining Block Rates
Billions of Gallons
30
25
20
15
10
5
0
1986
1987
1988
1989
1990
1991
1992
1993
Metered
Unmetered

Graph No. 2


Denver Water
RESIDENTIAL GALLONS PER ACCOUNT PER DAY
Metering Program
800
600
400
200
0
96 GAD
1986
1987
1988
1989
1990
1991
1992
1993
Unmetered
Metered

Graph No. 3

Planning

Conservation provides us more options in planning long-range supply projects. Denver Water has an integrated resource plan which, instead of just focusing on supply or demand, focuses on both, as well as reuse and other alternatives. Conservation also adds complexity to the planning process, particularly as it relates to evaluating the most efficient use of resources. There are different economies of scale that are unique to each utility which affect when and how a utility should conserve. If a utility has excess supply, it is not on the same planning curve as somebody else that is bumping up against current supply limitations. Before a utility decides on a conservation program, it has to identify what conservation should accomplish, when it should be implemented, and how it should be implemented.

Customers

The conservation message sent to our customers is that it is the least-cost supply alternative. Conservation also increases customer involvement, supply options, and customer-supplier relationships. On the other side of that, conservation will not guarantee that bills will go down. Conservation also tends not to impact all customers equally. For example, a fixed income customer who has achieved all the savings possible through retrofitting, landscaping, etc., may not be able to reduce his or her usage further. Contrast this with a customer who has a large lawn and plenty of resources for inefficient water use. This customer doesn't have the same kind of economic constraints and will be impacted differently by the adoption of an increasing block rate structure. Customers understand these differences and tell us "Well, that person can afford to reduce his usage or pay more, but I can't."

Finally, conservation cannot guarantee different water at the same price. What I am talking about here relates to the added complexity I've mentioned in long-range planning. Integrated resource planning has made available different types of water supply options. We are entering into different types of agreements, everything from spot sales to requiring reuse. All of this means that a gallon of water is not a gallon of water. It means there are different costs associated with providing different types of water. One customer who may be required to use reuse water may be paying a different rate from someone who is using treated water for the same purpose or use.

I spoke with someone in our public affairs office and asked, "Can I really talk about conservation as having a downside?" He said, "Yes you can, because we already do. In putting together our conservation master plan, we are very up front with our customers on what conservation cannot do." One of the quotes that I pulled out of our conservation master plan comes off of the first page. It says, "Water conservation is not a matter of reducing water use without limit; its purpose is not to deprive our community of the benefits for which water is diverted, for example, health, nutrition and environment. The purpose of water conservation is to provide those benefits as efficiently as practical, given current knowledge, state of technology and prudent cost considerations." Conservation has made our jobs more challenging in terms of integrating supply options and explaining the impacts on our customers.

Questions and Answers

Angela Montoya, Scott Chaplin and John Olaf Nelson

Q: (For John Nelson) You expressed a preference for hard-core conservation measures over an inclining block rate structure, and I was wondering if you could expand a little bit on the basis for that preference, and also with regard to your customers' feelings about that?

A: (John Nelson) I think it goes without saying if you were to take a survey on any utility, after you put on line an inclining block structure, you'd find the vast majority do not like it. The problem with most utilities is, when you analyze demand, take our utility, 85% residential, within one and a half standard deviations you will have the median customers, coming from the low-end user to the median customer. To go from the median water use customer to the customer who uses a lot of water, you have to go out seven to 13 standard deviations. What that means is you do not have a normal distribution curve for most of your customers. This is true not only for single families, but it is partially true for residential; it is true for other customers as well. Ok, what does that mean when designing a rate structure? What it means is it's very, very hard to design an escalating rate structure that is not unfair to somebody, in fact, to a lot of people. So, I don't like inclining rate structures. I like a uniform commodity rate where you pay for the same drop and everybody pays for the same amount of water, and if you do, you don't have the problem of explaining to the customers that if they don't conserve they won't win. Under a uniform commodity structure every customer who conserves will pay less money to the utility than they would have otherwise paid had there not been a uniform commodity rate structure or action taken. It is also true that if you have true revenue neutrality in implementing an inclining rate structure that, by-and-large, for the average of all your rate payers, they will pay less if they conserve. But, the problem is you are impacting a lot smaller audience, because you have a lot of inequality built into the program. To answer your question, finally -- why I like hard-core programs -- I think that is a fair way to do it. The hard-core programs I promote are based on choice; they are offers. The customer doesn't have to take up the offer, but if they do they are winners. Those customers who don't take up the offers are losers; they pay more in the end. They are paying rates on more water use, and what's wrong with that? That's kind of the American way, isn't it? Plus we maintain diversity in our culture, and if you achieve the ultimate goals you are after, in our case, 15 percent, I think its the smart way to do business.

A: (Angela Montoya) In evaluating conservation programs and rate structures, you have to focus on the objectives of your individual community. Right now, Denver Water is going through a major restructuring of its water rate structure. Currently there is an inclining block rate structure for residential customers and a declining block rate structure for all other users. Through our public workshops, our customers have analyzed and prioritized what objectives should be achieved through the rate structure. Interestingly enough, on a list that included equity, fairness, cost of service based, and legality, customers voted their number one concern and priority to be conservation.

A: (Scott Chaplin) I think this is probably the area where we need a lot more research to find out if there is a certain level where can have an inclining block, and maybe make sure it's generous enough that you are not being unfair to anyone who is using a reasonable amount of water.

A: (Unknown) I just would like to take one issue into focus. The person who comes out to these meetings is not the typical customer. Who are you? You are concerned. You are involved. Your are not typical. Eighty percent of my customers are not in this room; only 20 percent of them are here. Sure you're going to like conservation. You are concerned. You are wise. You studied it. But, the other 80 percent of the people I serve don't like escalating rates.

Q: (For John Nelson) Do you have any regulatory requirements or anything that was mandated through city council or some government to enforce this? I know you mentioned...

A: (John Nelson) Yes, we do have landscape ordinances that the city uses which are kind of difficult for the developers to employ, but in all the ordinances I get the county who handles the development -- they have discretionary approval for land use in our area -- to put a caveat in their regulations, and they are happy to

do this because it saves them labor. That caveat is: if an applicant for landscape before the county complies voluntarily with North Marin's program, North Marin gives the letter to the county saying they have done so, then the county's regulation is preempted. So we get a little more leverage on that. Now, that has just started.

Q: (For John Nelson) You used a figure of, if I'm correct, 536 gallons per day for a single family home?

A: (John Nelson) Average for 18 month demand. Factor from peak month to average month is 1.6. Peak month to January is probably around 2.2. On the question on regulations, we do regulate against irrigation systems. We do not say you can or can't have an irrigation system if you are a customer coming on line, but we're saying if you put an irrigation system on turf, then you must meet certain design criteria.

Q: (Unknown) There has been a short-term economy in conservation that produces less sales and you have to raise rates, but long-term there should be an economy where the rates would then level out. Have you looked at the time frame of the effect?

A: (John Nelson) The problem is masked by CPI, which is going up now at the rate of 1.8 percent, but will probably get back to three percent or more fairly soon, and by variations in water sales from year to year. I have not been able to see the impact of conservation in any individual year.

A: (Angela Montoya) I would like to add that the need for information on long-term impacts is one of the things we are struggling with. It's a challenge for us to really accurately predict what is going to happen to typical residential consumption patterns due to conservation and to sort out price and weather impacts on various classes. Once we can identify that accurately, then we can try to address some of those exact questions.

Agricultural Water Conservation - What is Possible?

Grant E. Cardon

Assistant Professor, Department of Agronomy
Colorado State University

Webster's dictionary gives two definitions for the word "conservation." The first is: "the act of conserving; preventing injury, decay, waste or loss". The second is: "the protection or preservation of natural resources". When most of us discuss ag water conservation, we immediately think of the supply of water, or the "waste or loss" of water. The title of the workshop this year implies a preoccupation with the quantity of water available to the "Urban Giant". We must always remember however, that our conservation efforts include the preservation of the quality of water. This presentation touches briefly on water quality preservation, but will focus on the "waste and loss" issues associated with ag water conservation.

Nowhere is the "waste" of water cited more often than when irrigation is observed on an individual farm basis. Irrigation technologies in Colorado run the full range of possible efficiencies. Conventional furrow, flood, and border irrigation practices (used on about half of our irrigated acreage) have an efficiency range from 25-60% with a mean of about 40%. Sprinkler irrigation systems, particularly those outfitted for Low Energy Precision Application (or LEPA) irrigation, can range from 60-90% with a mean of 75%. Irrigation application efficiency is a measure of how well the total application of water matches a desired "target" application. A simple mathematical expression used to calculate efficiency is as follows:

$$E_i = (ET / AW) \times 100$$

where,

ET = EvapoTranspiration (evaporation + transpiration or plant water use) since the last irrigation. This is the "target" value.

AW = Applied irrigation Water

If we assume, for the purpose of illustration, that a grower needs about 2 acre feet of water (ET) and that conventional furrow irrigation is practiced on about half of the irrigated acreage in Colorado (about 1.7 million acres) then we can estimate what the effect a change in irrigation technology may have on water supplies. The first conversion, or upgrade, in technology is often from conventional furrow to surge furrow irrigation. Surge furrow irrigation pulses water through the field to speed the advance of water down the furrow, and then cuts the flow back after advance to reduce runoff. Surge has a range of efficiency of 30-80% with a mean of 60%. Converting from conventional to surge furrow irrigation, we go from a mean efficiency of 40% to a mean of 60%. Using the above equation and assumptions listed, this means a reduction in water use of about 2.83 million acre feet of water, or 923 billion gallons. That's enough water to supply every individual in a city the size of Ft. Collins (pop. 140,000) with 100 gallons of water a day for 180 years. The same calculation when done for the upgrade to sprinkler irrigation results in a "savings" of nearly 4 million acre feet of water, or 1.29 trillion gallons.

Most, if not all, people, when presented data such as this would say that our water needs can be simply met by requiring agriculture to adopt even simple improvements which increase efficiency. However, most of us fail to understand just what happens to the "wasted" water from a single farm. Where does all that water go? There are three possible fates: a) it can return directly to streams, canals, and rivers by surface flow, b) it can return to the same by subsurface flow as shallow groundwater, or c) it is sometimes captured on-farm in ponds for later reuse. In all cases the water can be further used at a later date and/or further downstream. In the South Platte River basin it has been estimated that "wasted" water upstream is reused about 7 times before it exits the state to Nebraska. The following data will hopefully demonstrate what that means in terms of the possibility for conservation.

Data taken from the 1993 Colorado Agricultural Statistics summary gives the values for the irrigated acreage of all crops in the state. This data is summarized in Table 1. Some of the counties is this state pump their irrigation water from deep groundwater. Adjusting the irrigated acreage for the acreage within the major groundwater pumping

counties, we obtain the acreage that must be irrigated with surface water supplies (reservoir and river water). Data for the ranges in crop water requirements is available for all the major crops in Colorado and that is also given in Table 1. With these data, we can estimate the range of water needed by agriculture as it stands, with its current land base and suite of crops. This exercise estimates the need between 5 and 9 million acre feet of water annually. Agriculture uses about 85% of the water available for use in this state, or about 5.3 million acre feet. This is within the range of expected requirements, and is actually quite conservative given the range of need. In fact, if the mean crop water requirement of 7 million acre feet is taken for comparison,one might contend that agriculture is using less water than is needed for optimum production.

The reason for the discrepancy between our first exercise with irrigation efficiency and the estimates of crop need, results from this concept of downstream reuse. Under the current water rights appropriation system of Colorado, one grower's "waste" is another's livelihood. Return flows from inefficient irrigation upstream are accounted for in the rights of junior irrigators downstream. Therefore, one can argue that taken on a state-wide, or basin-wide basis, agriculture is very efficient and therefore there is no room for "savings". This approach however, denies the second definition of conservation, or the "quality" aspects of water. Water left in storage or in-stream would certainly be of higher quality than that passing through agricultural fields and soil profiles on its way back to the stream. Perhaps, in terms of the second definition of water conservation, increased downstream storage should be built to hold water for junior appropriators and all irrigators should be required to increase irrigation efficiency.

Moreover, what about overcoming tradition and evaluating the amount of land in production and the crops being grown in this state? Can we find more water-use efficient crops that would still provide the economic base we desire while saving water and perhaps even reducing the land base? The questions facing all players in the struggle towards responsible water use in this state are faced with a complex blend of scientific fact, politics, law, and social values. In fact each camp often brings to the table its own list of definitions and perceptions of which issues are most important. Before real improvements in this state can be achieved, a broad evaluation must be made by all parties on what each other is trying to say, and what goals are to be achieved. To provide a starting point for discussion, a base for the hopeful development of consensus, a new task force has been created by the Colorado Water Resources Research Institute (CWRRI). The task force members are from municipal, industrial, and agricultural agencies and are listed below:

Ralph Curtis	RGWCD
Rod Kuharich	Colorado Springs Util. Dept.
Chuck Lile	Co. Water Conservation Board
Mike Gross	CRWCD
Dan Parker	Co. Soil Conservation Board
Hal Simpson	State Engineer
Eric Wilkinson	NCWCD
Dan Smith, Chair	CSU, Soil and Crop Sci. Dept.
Richard Bartholomay	CSU, Coop. Ext., CRSCP
Israel Broner	CSU, Ag. & Chem. Engin. Dept.
Grant Cardon	CSU, Soil and Crop Sci. Dept.
Dan Champion	CSU, Coop. Ext.; CRSCP
W. Marshall Frazier	CSU, Ag. & Resour. Econ. Dept.
Kathleen Klein	CSU, CWRRI

The task force has three main objectives. The first is to develop a compilation of definitions and language associated with ag water conservation. The second is to describe the potential impacts, intended or unintended, that conservation could have on water rights, economic viability of agriculture, crop production, urban water supplies, aquatic ecology, and water quality. The third objective is to evaluate alternative structural and nonstructural means to achieve more irrigation efficiency (eg., ditch lining, new irrigation systems, irrigation scheduling, water-use efficient crops, etc.). The intended product of the task force's deliberations is a guidance document for Colorado that will help form the foundation on which discussion and reforms can be civilly conducted and responsibly constructed.

Crops Grown (1992)	Irrigated	Surface	Water req (ft)	Water req (ft)		Total water req. (ac-ft)	
	acreage	supplied	Low	High		Low	High
Alfalfa/Hay	1,135,000	1,018,700	2.62	5.25		2673753.28	5347506.56
Barley	104,000	66,600	1.48	2.13		98326.77	142027.56
Corn(Grain+Silage)	1,715,000	1,030,600	1.64	2.62		1690616.80	2704986.88
Dry Beans	121,000	88,600	0.98	1.64		87204.72	145341.21
Oats	19,500	15,300	1.48	2.13		22588.58	32627.95
Potatoes	78,000	40,700	1.64	2.30		66765.09	93471.13
Sorghum(Grain)	50,000	22,400	1.48	2.13		33070.87	47769.03
Sugarbeets	40,200	39,730	1.80	2.46		71691.27	97760.83
Sunflower	70,000	39,200	1.97	3.28		77165.35	128608.92
Wheat(Spring+Winter)	167,000	71,500	1.48	2.13		105561.02	152477.03
Cabbage	1,300	1,300	1.25	1.64		1620.73	2132.55
Cantaloupe	1,200	1,200	1.15	1.80		1377.95	2165.35
Carrots	2,700	2,700	1.15	1.80		3100.39	4872.05
Cucumbers(Pickle)	1,500	1,500	1.15	1.80		1722.44	2706.69
Lettuce	3,600	3,600	1.15	1.80		4133.86	6496.06
Spinach	3,300	3,300	1.15	1.80		3789.37	5954.72
Sweet Corn	3,600	3,600	1.31	2.30		4724.41	8267.72
Tomato(Processing)	160	160	1.31	1.97		209.97	314.96
Onions	14,500	14,500	1.15	1.80		16650.26	26164.70
					Total (MAF)	4.96	8.95
					Mean (MAF)		6.96
					Currently Diverted (MAF)		5.50

Agricultural Conservation: What is Possible?

Comments by

Bart Woodward

Superintendent, Riverside Irrigation District

Thank you very much for inviting me here today. I am Superintendent of the Riverside Irrigation District. It irrigates approximately 35,000 acres on the South Platte, so everything that I address today concerns the South Platte. I don't pass myself off as an expert on the Colorado River, the Gunnison or the Arkansas. What I refer to today is strictly the South Platte.

If you build efficiencies into your irrigation system, they will come. Who are "they?" First of all, while you are in construction and while you are thinking of the idea, the politicians and environmentalists will be there, and they all will be patting you on the back telling you how smart you are. Get it built and they will all go away. For a year or two, you can sit there fat, dumb and happy and everything will be all right. Then, more people are going to start coming. The next to show up at your doorstop will be your neighbor that lives downstream of you, and he will be scratching his head because his diversion is dry. He is wondering what happened to his water that has been there for 100 years.

Then, in a couple more years, or maybe five or ten years, the State of Nebraska is going to knock on your door. They are going to ask, "Where is all that water that used to come across the state line into Nebraska? It isn't there anymore." Finally, Lee Carlson will show up from way down there in that critical habitat and say, "This thing is plumb dry now! Where did it all go?" And it all started with building a better, efficient irrigation system. Where did it all go? Grant did a fantastic job in explaining to you the efficiencies of the South Platte. If you can recall the illustration that he had of Farm A and Farm B, that is a good illustration of 1859 to 1870, but that illustration doesn't go far enough.

There are basically three major events in history on the South Platte, dating from 1859 when the first diversion was made up until recent times. Briefly, the first event that really impacted the river happened in 1870. All of you have heard of Horace Greeley, who sat back in New York and said, "Go West, young man, Go West." Some took that advice, came and founded the Town of Greeley, and built two large irrigation canals that diverted water from the Poudre. Unlike the illustration that you saw, where the return flows were almost instantaneous, they took that water clear out into the countryside. They took it up on the high deltas and they took it away from the river. Their system was equally as inefficient as the one that you saw here. It didn't immediately return to the river.

The thing that impressed me the most with Grant's talk was the amount of water that was wasted by agriculture. Do you know where that water is today? That water is in storage. It is out underneath those faraway lands where Horace Greeley and his crew took that water, irrigated with it, and their wastewater began to percolate back into the underground, but it took time. It didn't get there the first year, the second year, or the third year -- in some cases it took 10 to 15 years. We have a term on the South Platte called SDF -- stream depletion factor. It is a factor in terms of how many days it takes to impact the stream by some percentage when you either withdraw water or replace water. With the stream depletion factor, we are dealing up into 11,000-12,000 days. Divide that by 365 days and you can put it in the perspective of years. That water is stored out there and it is stored there today, but it is all up-river and all up-hydraulic of the South Platte River at some point.

Gravity is a wonderful thing in the water business. If you are on the low end of the totem pole, it eventually gets there. It might be too late and it might not be in the quantity that you want, but sooner or later gravity brings it back to the river. That is what is happening today. There are tremendous amounts of water stored underneath those dry, arid lands.

I want to refer to another piece of history that really describes what the South Platte was prior to 1840 or 1850 when the white man came to this country and started to make diversions. From John C. Fremont's diary of 1842, this quote came from the very area where I grew up. He said:

Buffalo absolutely covered the plain on both sides of the river, and whenever we ascended the hills scattered herds gave life to the view in every direction...With the exception of the Platte bottom, the country seemed to be of clay formation, dry and perfectly devoid of any moisture and baked hard by the sun. Turning off toward the river we reached the bank in about a mile, and there were delighted to find an old tree with thick foliage and spreading branches where we encamped for the night.

For those of you who have traveled up Interstate 76, which basically follows the Platte River into Colorado from Nebraska or vice versa, you see off to your right in most cases a large band of green trees, green grasses, and I want you to understand that it is all artificial. Those trees were not there in 1840. Fremont was delighted to find a single tree to camp under.

There is another quote that many of you have probably heard -- that the Platte River was a mile wide and a foot deep. The rest of that quote is:

The Platte was a mile wide and a foot deep in the Spring months and a bed of desert sand during the Summer.

That river totally dried up from the City of Fort Morgan to the state line. There was absolutely no water running in it. It could sustain nothing. Freighters that came up the river had to dig into the sands to water themselves and their livestock -- their power units in those days.

The river today is sustainable, and this is caused in part by what you saw in Grant Cardon's illustration, but more in part because of the impact of taking that water far from the river and letting it come back. It comes back in a constant, daily stream. So, what happens if you start economizing in those systems? You are going to destroy the storage that is out there. If you don't basically waste the water that historically has been wasted by those systems, that storage mound that is gradually, by gravity, working its way back to the river, is going to be gone. We can convert this river back to what it was in 1840 if we want to. One of the ways to do it is by fooling ourselves about agriculture water efficiencies. They are not there -- Grant, I think, explained that agriculture actually is short of water. And on the short term, you can do it. You can make those efficiencies, but you are going to kill the river in the long run. Then Lee will come after you, if he hasn't already.

The second event that really changed the Platte River was the construction of the Plains storage reservoirs. This happened right at the turn of the century, 1900. Those reservoirs were equally as inefficient in terms of leakage, from the bottom and from the canals, but those reservoirs, on a day-after-day basis, supply return flows to the South Platte River.

The third event is transmountain diversion. Transmountain diversions have come in of late, but they are not yet, in my estimation, fully impacting the state line at Nebraska. They are just now getting into our region, and it has been happening since 1949 or 1950, with Northern in the mid-50s when those waters were first brought over here. It took years for those return flows to work themselves through the upper part of the South Platte region, and by the upper part I mean that part above Kersey and below the Front Range. They are getting there now, but they have not reached the state line yet. When they do, you will see another increase in the state line. If you look at a hydrograph of the Julesburg gate since 1900, it is ever increased on an annual basis. There is more water going out of the state today than there was in 1900. Yet, we still sustain the agriculture and the cities of the Plains. That amount of water will continue to grow so long as we don't tamper with the storage that is underlying that river and supplying it on a daily basis.

I want to impress upon you that water conservation and use of that saved water someplace else, under the same priority date for another consumptive use, is totally unacceptable on the South Platte. I am not saying it cannot be done on an individual basis in certain locations, but as a master plan, forget it, because you are going to take it back to a bed of desert sand.

Agricultural Conservation - What is Possible?

Comments by

Ruth Hutchins

Fruita, Colorado

Before presenting my views on our assigned topic, I wish to clarify the title Lucy assigned me in the program. Ruth Hutchins, Farmer, Fruita.

First, I am not a farmer. I am a farm wife, mother of four children, and married to a retired farmer husband. I am a lousy tractor driver. I could never even attempt to drive my son's new John Deere tractor. I can do small chores on the D15. As I have a strong feeling of self-preservation, I have deliberately never learned to become a premiere irrigator. I can place dams in the ditch and set siphon tubes, but only on a total immersion basis.

This workshop is not weighted with farmers. There are bureaucrats from federal, state, and municipal agencies; attorneys; engineers; and environmentalists. Are there any farmers here? I hope so, as it is your water that is coveted.

I speak as an independent individual who has no salaried job but who has immersed herself in the study of water issues, as our farming life depends on water.

I cannot emphasize enough that our family farms do not lie under a federal Bureau of Reclamation project system, or in an irrigation district, or in a water conservancy district. Our lands are served by private irrigation canal or ditch companies, mainly in the Grand Valley of the Colorado River.

My presentation was to focus on the following statement:

Since agriculture in Colorado accounts for 95 percent of the state's water consumption, if farmers would just conserve a tiny bit there would be enough water for the metro area to double in size.

I do believe in conserving agriculture.

God forbid the metro area should double in size.

I will divide my statement into two parts:

First, programs for individuals perfected on the farm for the farmers' benefit and which usually include Agricultural Stabilization and Conservation Service, which I shall hereafter refer to as ASCS; and second, the Soil Conservation Service, which I shall refer to as the SCS, Department of Agriculture cooperation.

Second, efforts of a collective nature which occur on federal projects. The most notable is the Imperial Irrigation District's joint work with the Metropolitan Water District. I will refer to the Imperial Irrigation District as IID and the Metropolitan Water District as MWD.

First, the Department of Agriculture's Soil Conservation Service and ASCS programs require cost sharing with the cooperator-farmer. The cost-share ratio has ranged from 90/10 (ASCS pays 90 percent and the farmer pays 10 percent) to 80/20, down to 70/25, to the current 70/30. And, I understand funding is very uncertain for fiscal year 1995. Practices (experience from our farming) we have used are cost sharing on tile drainage installations -- tiling open drainage ditches and backfilling from the spoil banks, digging new drainage ditches, installing tile and filling so the covered ditches can be incorporated into a field.

It is most important to remember, in irrigated country, that when you put water on the ground you must make a way to take the water off.

Land leveling has been accomplished -- a field is leveled to a specified grade to facilitate irrigation. This action also can square up a field, combine small fields into one large field, and eliminate short rows and point rows. Quarter-mile rows for corrugated (creased) irrigation in a level field which keeps the side slope in the proper relation to the down slope is ideal. Cement lateral ditches, cement field head ditches have been installed on our farms, and also some gated ditches. We have not used surge irrigation, as we have not been able to beat the trash/moss problem.

Crops raised are: corn, small grains, alfalfa, grass seed, soybeans, pinto beans, grass pasture, and beets (prior to 1976). Benefits accrue to the individual. The participating farmer is paying his designated share for the improvements in order to reap his reward -- maximizing his water use, increased efficiency, larger sets, time saved, watering more evenly, and perhaps even being able to apply water one more time over his field which could increase the yield. These managerial benefits lead to an increase in money earned.

These practices are not in conflict with the state water law. The State Engineer's Office does not usually question a water right use if improvements are installed that increase irrigation efficiency. As long as no new land is irrigated, increasing the consumptive use, there is no problem.

There is no room for water in the metro area here.

Two obvious ways to water the metro area are for an individual to sell his farm land with its water or to sell the water from the farm.

This was accomplished in many instances on the West Slope during the oil shale episode. The buyers were oil companies.

The metro area was not watered.

Fallowing ground in a systematic manner to shift the consumptive use to a municipality may be attempted during drought. Water sharing will not work on perennial crops -- only on annual row crops.

Second, enterprises of a collective nature can occur on federal projects in which delivery system improvement is coupled with individual managerial cooperation. As stated previously, the IID's contract with the MWD in Southern California is the prime example. IID was ordered by the State of California to save 10 percent of its water, which amounts to 100,000 acre-feet per year. MWD, being the next senior right, made a nice deal to pay IID $100 million for system improvements on selected sections of the 1700 miles of canals, laterals, etc. Headgates were upgraded, penalties were charged for overusing water, triple rates were charged for excessive runoff at the field end, and tailwater ponds were created and pumps installed to deliver the water for reuse. The cost of the pumps was cheaper than the initial cost of the water.

Changes in irrigation calls for water use were diminished to include 12 and 24-hour sets. Interceptor canals were created to carry water for reuse.

However, one must remember, IID raises high-value crops during a year-long growing season, and the measures fit the lay of the land in the district.

In Colorado, the Grand Valley Water Users Association is a nonfederal entity managing the federal Grand Valley Irrigation Project, and is also responsible for the execution of their system is improvements under the Colorado River Basin Salinity Control Act, the Grand Valley Unit. Major components are canal lining, installation of pressurized pipe laterals, and new water meters.

One result of this program is the freeing of an estimated 29,000 acre-feet of seepage water (EIS 1986) which would no longer be lost to the groundwater. The amended Salinity Control Act of 1984, Title II, addresses this water in Section 202(6)4:

> *In implementing the units authorized to be constructed, [Section 202a(1-5)] the Secretary of Interior shall comply with procedural and substantive state water law.*

Entities in the metro area are quietly counting on this water as a potential source to be available in the future after the federal salinity project is finished. Eventually, the seepage water would not be diverted. The structural improvements would negate the need for this lost seepage -- water agriculture never used. State law prevails.

The senior/junior appropriators are waiting.

The Fish and Wildlife Service and the Bureau of Reclamation are also waiting.

They are working. These federal agencies are attempting to secure the way to use the seepage and administration water for the endangered fish in the 15-mile reach and downstream.

Acknowledging the interest in this water by various parties, a memorandum of understanding was drafted concerning the Grand Valley water management opportunities, a study cost shared by eight parties; as expected, the Grand Valley Water Users Association -- it is their system -- the Colorado Department of Natural Resources, the Colorado Division of Water Resources (State Engineer), the Colorado Water Conservation Board, the Colorado River Water Conservation District, Denver Water and the Northern Colorado Water Conservancy District -- these two are the senior/junior appropriators -- and the Department of Interior's Bureau of Reclamation.

A solution is being sought. Perhaps Congressional legislation to amend the Reclamation Act of 1902 to allow a change of water use could be enacted. It would appear that a sharing of the water between the endangered fish and the endangered farmer could be devised in order to keep the federal water right whole and benefit both.

Corresponding state legislation would also be required.

Perhaps Denver and Northern, as they are negotiating in good faith, will negotiate a guarantee that future Section 7 consultations under the Endangered Species Act will give all proposed water projects of the future a nonjeopardy opinion.

The Colorado River mainstem is the water source being readied for future hydrojacking.

The River can give no more.

What new water does the metro area have?

Fifteen thousand acre-feet the Colorado River Water Conservation District sold to Denver. This water represents the majority of the yield of Wolford Mountain Reservoir. Denver bought 40 percent of the reservoir and its water from the district. This water was originally declared as compensatory storage for the West Slope and West Slope water users as a result of the Windy Gap project settlement.

And this district is our champion?

Perhaps the Northern Colorado Water Conservancy District has the potential to continue to perform well and can provide water for the Metro Area.

Denver is paying $1 million a day waiting for the baggage delivery system to operate at the "Denver Invisible Airport." (That's a quote from the *LA Times*.) This airport is to aid the doubling of the metropolitan population for which we, each one of us, is asked to provide a tiny bit of conserved water.

Will Denver pay $1 million a day to all the irrigators in the state to collect their conserved water and deliver it by the bucketload to the Metro Area?

Agricultural Conservation: What is Possible?

Comments by

Steve Glazer

High Country Citizens' Alliance

HCCA is a 17-year old, local grassroots environmental organization in Crested Butte with 400 members. It was originally formed to address the impacts of a proposed Molybdenum mine on Mount Emmons, just three miles west of town. When that threat went away, we broadened our scope to include public lands management. Our interests have continued to expand to include private land use and water issues. The goal statement of our water program is as follows:

> HCCA believes that the practice of building new water developments for consumptive uses in ending. American society is increasingly focusing on more efficient uses of existing resources and reallocations of water to "higher and better" purposes. We want to ensure that those uses and purposes clearly address and protect the water needs of natural ecosystems. Improvements we seek include enhanced, clean flows for aquatic, riparian and wetlands habitats and measurable, *natural* increases in the populations of endangered fish and other species. Furthermore, we want Colorado's water allocation system to better recognize the water needs of the human users and natural ecosystems which depend on instream flows and to accommodate the public values inherent in water resources. We also want to ensure that traditional water uses which produce environmental and social benefits (such as agriculture) continue to receive adequate amounts of water. To achieve these goals, we want significant changes in Colorado's water policies and laws.

When Aurora and Arapaho County came looking to transfer water out of this basin in 1986, we took a close look at how the Metro area was using water and realized that there were few or no water conservation programs in place. We live in a semi-arid climate, but everyone down there seemed to think they were living in Ohio. In 1991 HCCA authored the Colorado Water Conservation Act and with the help of Trout Unlimited it was adopted by the State Legislature and is now law. We also authored a bill with the National Wildlife Federation that would have required least-cost analysis of all alternatives before a trans-basin diversion could be proposed. With this one, we did not succeed.

We support water conservation by all water users because we have reached the limit of the resource. We support ag conservation not as a source to feed urban growth, but because it can improve water quality by eliminating deep percolation, reducing non-point source pollution, and it is needed to revive our riverine systems. The words conserved, salvaged and saved have been used a lot. Before we go any further, I want to make sure we all understand the difference. Conserved water is the quantitative difference between a beneficial consumptive use and the lesser consumptive use after reducing or eliminating waste. Since waste is prohibited in Colorado, conserved water is not available for reallocation but must be reintroduced to the prior appropriation system. Salvaged water is part of an appropriation that is lost to users as a result of evaporation, transpiration and seepage, but is recovered by more efficient consumption. Saved water is the amount which has been available to a direct flow right in priority which is no longer needed at the headgate because of improvements in the conveyance system. Now, is that clear to everyone. Agricultural water efficiency is actually quite complicated.

The question posed for this panel, can agricultural conservation serve urban needs, is more appropriately posed in California than in Colorado. In California agriculture is geographically sandwiched in between the source and the urban users on the coast. In Colorado, additional supplies can be made available to cities by using creative and collaborative management of water by techniques such as first-use agreements. That is where downstream senior appropriators allow upstream cities to use the water first, out of priority. The cities only have to augment the amount consumed to prevent injury. The first example of this, in Colorado, was with Standley Lake. A more recent first use demonstration is Barr Lake. There needs to be more shared use besides just between agriculture and cities. Water rights holders need to be more sharing with nonproprietary users (who are mostly nonconsumptive users) such as rafters, who are not allowed to own instream flows (ISFs). The Legislature has prohibited anyone but the Colorado Water Conservation Board from owning ISFs. The Upper Gunnison Water Conservancy District got around that prohibition by securing storage rights to be released as optimum flows to enhance fisheries and aquatic and

wildlife habitat in the Taylor River.

The main reason we are not likely to see any more large water projects is because we have not learned how to do hydro-mods without impairing water quality and destroying native fish habitat -- that's hydrologic modifications -- and for those of you who still don't know what they are, they are dams and diversions. And for those of you who covet the full development of our compact rights NOW, what you already have is likely to be more than you should have. Every river basin in Colorado has endangered species or is about to. The Federal Omnibus Water Act of 1992 required the Central Valley Project in California to reallocate 25 percent of the yield of that project back to the environment because they built the project too big. Eddie Kochman of the Division of Wildlife told the Colorado Water Conservation Board (that was meeting here for the past two days) that we not only have four endangered fishes in the Colorado River, we also have eight declining species. The reason we are not likely to ever realize our full Colorado River Compact is because of the flawed assumption that we consume the yearly yield of the river to extinction. To restore the Colorado, the other six basin states will probably have to give up yield, the Bureau of Reclamation will have to reoperate their projects and buy out the Welton-Mohawk Irrigation District in southern Arizona, and revitalize the Colorado River Delta. (Can anyone explain to me why they grow cotton in the desert?)

So, if we can't build any more big dams, how do we store more water? By allowing saved and salvaged water to be used to recharge our wetlands and recreate the 50 percent of wetlands we have already destroyed. Spring snowmelt is needed to recharge groundwater as well as wetlands. Wetlands provide better flood control than dams, because they also provide habitat for over 90 percent of our wildlife and are a natural water purifier. Wetlands will also provide natural streamflows through the summer and fall by discharging back into the streams and rivers. So where do we put all these wetlands, you may ask? In the flood plains, after we all move out of them. One week ago, the Army Corps of Engineers released their new flood plain national policy. They will start using their resources to relocate people out of flood plains, build and rebuild **no more dikes, levees or rip-rap**, and discourage new developed use of flood plains. I think the FEMA flood insurance program is an endangered species.

The Colorado Water Conservation Board has conducted two studies on ag salvage since 1991 and the '93 Legislature appropriated grant funds for pilot programs for agricultural water conservation, water use efficiency, reuse, reclamation, and multi-purpose systems. Another agenda item at the CWCB meeting was a status report on a $325,000 investigation of the Bureau of Reclamation's Grand Valley Project as part of the Colorado River Endangered Fish Recovery Program. Preliminary estimates show 109,460 acre-feet of spills and losses that might be recoverable. The study listed ten different approaches to share this water in the 15-mile reach for endangered fish and with water users. They are leaning toward a legislative solution. I, too, have come up with a legislative proposal for salvaged and saved ag water. But to share this proposal with you, it first requires a disclaimer.

The opinions expressed above and below, are *this* environmentalist's point of view. You know, you really have to be careful anymore, because even when you think you are doing the right thing, unless it's a long established and widely accepted idea, you'll find yourself being attacked even by your allies. And this HCCA knows from experience, with the Gunnison Proposal for Range Reform that Secretary Babbitt liked so much. The status quo, no mater what side you're on, has enormous inertia. Well, business as usual is not acceptable any more. So, here is something that everyone can oppose:

Respecting the prior appropriation doctrine, with "no injury" to downstream juniors, I propose that for basins that don't have interstate compact delivery obligations, as an incentive to save and salvage water, the user can reallocate (that means sell or lease) saved water downstream only. Salvaged water can go upstream or downstream. And trans-basin water can go upstream to the basin of origin only. Saved and salvaged water is needed to eliminate dried-up streams and to revitalize riparian ecosystems. And while we're at it, we should remove the immoral statute that states that water quality cannot interfere with water rights or development. If it would make anyone feel better to be able to blame someone for our water problems today, you can point your finger at Sir John Crapper. He is the one who invented the use of water as a waste stream to dispose of human waste.

Questions and Answers

Bart Woodward and Ruth Hutchins

Q: (Ruth Hutchins for Bart Woodward) In the talks a number of years ago about water conservation legislation that Tim Foster proposed, the Colorado Water Congress and the Eastern Slope Farm Bureau were dramatically opposed to it. One of the things that is needed very much is understanding -- you kept saying that you were just from the South Platte -- I mentioned I was from the Colorado River, and the conditions as you know are very, very different. We are both agricultural people, so somehow or other we have to realize that maybe something should be done for the Colorado River people that maybe wouldn't be good and apply to the Platte.

A: (Bart Woodward) If you recall, the original legislation which was proposed, and which we all said we would support, was based solely on salinity control and somehow that got taken out, so that left it as salvaged water for the whole state. It became apparent then that we had to oppose it. We didn't oppose the original, which was strictly water saved through salinity control. They couldn't specifically say the Grand Valley, but that said it as clear as anything. When that was taken out of the bill we had to oppose it.

(Comment by Ruth Hutchins) And the problem there was that our particular canal company was not a part of the salinity control program.

Q: (Kathleen Klein) You mentioned that the State Engineer's Office doesn't get involved if you are working with improvements on your farm and you don't change your consumptive use. What is your feeling on quantification of your water right should you try to sell it? Is your diversion reduced and would your right also be reduced as a result of conservation efforts on your farm?

A: (Ruth Hutchins) We don't totally consume everything we divert.

(Bart Woodward) Water quality has been mentioned here quite a bit concerning how to maintain it if you are going to use underground storage as the bulk of the storage. Obviously, you could replace that underground storage with aboveground storage which nobody likes either. I would like to read a quote:

> *Julesburg to Denver City the immigrant on the freighter has a dead pull of sand without a stick of timber or a drop of living water save the Platte itself. All will admit that the Platte waters were so strongly impregnated with alkali as to render it dangerous to water stocked from it.*

The day of that quote was September 25, 1865. The water is a lot better than that today, and it is because of the return flows that are out there. There are places where if it wasn't for agricultural waste there would be no water. The underground water that is returning back to the stream probably has more to do with the quality of the water that was diverted than the land it passes through. Though water quality is somewhat of an issue, in terms of the Platte you need to understand that if we don't have bank storage out there and somewhat degrade that water getting it back to the river, we don't have any water. So, you have a choice.

(Moderator) And Ruth, I suppose your response to that would be that the situation in the Grand Valley on the West Slope is quite a bit different.

A: (Ruth Hutchins) Yes, very much so.

Q: (Ruth Hutchins) And I understand, Mr. Woodward, that the return flows are slowly showing up further downstream, which shows that your irrigating practices and water use aren't beneficial to the valley or the area over there. Your river is alive further downstream.

A: (Bart Woodward) Today there is probably about 125 cfs passing the gaging station at Kersey. There is probably 65 cfs leaving the state at Julesburg, and there is approximately 500,000-600,000 acres of farm ground in between the two points that are all getting water from someplace, and it is return flows.

Q: (Ruth Hutchins) How much water is the Colorado-Big Thompson Project diverting from the Colorado River

A: (Bart Woodward) It brings about 225,000 acre-feet a year, which would be enough to irrigate 125,000 acres if it was all applied. We are talking about 1.2 million acres. That is a small drop in the bucket.

Cooperative Ways to Quench the Giant: Options for Moving Water From Agriculture to Urban Uses**

Teresa A. Rice

Senior Attorney, Natural Resources Law Center
University of Colorado

I. The Need for Alternative Approaches to Meeting Urban Water Demands

A. The traditional solution to meeting new water demands in the West was to expand the usable supply by building water storage projects or by tapping groundwater sources.

B. Concern about protection of remaining undeveloped streamflows, abou the other environmental impacts of water storage projects, and about mining of groundwater limits the ability of these sources to meet new demands.

C. Increased attention has turned to purchasing rights to water used in irrigation and transferring the water to urban uses.

D. Initially such transfers involved the gradual shift in land and water use as urban growth expanded onto adjacent agricultural lands.

E. In the past several decades cities have been purchasing water rights used on agricultural lands far removed from their boundaries, and the purchases are of larger blocks of water (and land) rights.

F. Thus water transfers have changed from a gradual, incremental process of land use change to sometimes rather dramatic transactions.

G. The implications of large-scale, long-distance water transfers are prompting review of state water transfer policies.

H. Western states are taking a number of approaches to address agricultural to urban water transfers.

II. Providing Incentives to Conserve

A. Trust Water Rights in Washington

1. Washington State Legislature in 1991 directed the Department of Ecology (DOE) to develop a state "trust water rights" program.

2. The intent of the program is to facilitate the voluntary transfer of water to meet current and future water demands.

3. Holders of an appropriative water right may voluntarily transfer all or a part of their water right to the state, to be managed in trust by the DOE.

4. Only water "that has been beneficially used in a reasonable manner" will be considered for transfer.

**This paper is based on a report by Teresa A. Rice and Lawrence J. MacDonnell, "Agricultural to Urban Water Transfers in Colorado: An Assessment of the Issues and Options," Colorado Water Resources Research Institute Completion Report No. 177 (Dec. 1993).

5. The transferred water right (Trust water right) will maintain its original priority date, and is not subject to relinquishment or forfeiture.

6. Trust water rights acquired through the funding of water conservation projects are not subject to the statutory requirements applicable to water rights transfers in general.

7. However, statutory provisions governing Trust water rights contain similar conditions that must be met prior to the exercise of a Trust water right.

8. Once a water right is changed to a Trust water right, the DOE may allocate the water right to one or more beneficial uses, including instream flows, irrigation, and municipal uses.

9. One incentive to transfer water to the state under this program is the ability to obtain financial assistance from the state for system improvements -- loans and grants are available to an applicant for making improvements to water delivery systems that will result in a savings of water.

10. Transfers of conserved irrigation water, for example, may occur as a result of improved irrigation efficiency without any reduction in the amount of irrigated acreage.

11. Another approach under the program is the payment of direct compensation for not using a water right -- a water rights holder may be paid to temporarily or permanently stop irrigating specific lands.

12. There is the potential incentive under the program that a portion of the water saved could be given back to the holder of the water right.

13. The portion of saved water turned over to the water rights holder would likely be represented by a certificate as a distinct water right.

14. If this option is allowed, it is possible that the water right holder's portion of the saved water could be used for spreading (increasing the acreage under irrigation) or for transfer to another use.

B. Oregon's Water Conservation Law

1. Conserved water is defined as "the reduction of the amount of water diverted to satisfy an existing beneficial use."

2. Prior to implementing efficiency improvements, a water conservation proposal must be submitted to the State Water Resources Commission for approval.

3. State water transfer laws requiring the filing of a request for transfer are expressly waived for water conservation proposals.

4. Following a public comment and protest period, the Commission must find that the proposed plan is feasible, will produce conserved water, will not cause injury to existing water rights, and will not adversely affect the public interest.

5. Of the quantity of saved water, some portion may be relinquished or reallocated to mitigate the effects of the proposal on other water users.

6. The Commission is required to allocate 25 percent of the balance of the conserved water to the state and 75 percent to the applicant, unless the applicant proposes that a higher percentage go to the state.

7. The conserved water is given a priority date of one minute after the original priority.

C. Montana's Salvage Statute

1. Similar to the Oregon approach but without the 25 percent dedication to the state, Montana in 1991 adopted a salvaged water program to encourage conservation and full use of water.

2. Holders of appropriative water rights who salvage water may retain the right to use that water.

3. "Salvage" is defined as making water available for beneficial use from an existing valid appropriation through the application of water-saving methods.

4. Salvaged water can be leased or sold, and the use changed, subject to approval by the state agency.

5. To change the purpose or place of use of salvaged water, it must be shown that: (1) the proposed use will not adversely affect the water rights of others; (2) the proposed means of diversion, construction, and operation of the appropriation works are adequate; (3) the proposed use is a beneficial use; and (4) the applicant has a possessory interest, or consent of the person with such interest, in the property where the water is to be put to beneficial use.

6. Changes involving 4,000 acre-feet of water or more, and 5.5 cubic feet-per-second or more require the applicant to also prove that the proposed change is reasonable, under guidelines set out in the statute.

III. Short-Term Transfer Approaches

A. State Laws Supporting Short-Term Transfers

1. Several western state water laws contain provisions recognizing the right to make short-term transfers of water.

2. The advantage of making transfers under these statutory provisions rather than the provisions dealing with permanent changes of water rights is that, in most of these states, the approval process for short-term transfers is more streamlined.

3. The time period for which such changes may be granted varies from state to state but is commonly one year.

4. The quantity of water that can be temporarily transferred may be explicitly limited to historic consumptive use and is always subject to the no injury rule.

5. Transfers under these short-term transfer laws are, for the most part, encouraged by limiting the water transfer review process.

6. Several of the states recognizing temporary transfers provide for a more limited administrative review, requiring a hearing only if the limited review reveals that the proposed change might injure other water rights or otherwise not comply with statutory requirements.

7. A few state provisions allowing temporary changes were enacted years ago and should be updated.

B. Water Banking

1. Banks function primarily to help match those with water rights with those needing water.

2. Transactions usually are not for permanent transfers of rights but for rentals or leases of the right for some specific period of time.

3. The owner of the water right retains title to the right during the period of rental or lease.

4. Water rights placed in a bank are generally protected from forfeiture or abandonment challenges.

5. Mechanisms differ, but water banks often have some type of institutional manager and established practices or rules that govern bank operations.

6. Often, banked water is placed in some type of surface or underground storage facility.

7. Fees assessed on bank transactions beyond the cost of administration can be dedicated to a "mitigation fund" to offset third party impacts.

8. States wishing to initiate a water banking program should adopt broad authorizing legislation that encourages water banking while establishing a framework within which banks could operate.

C. Dry-Year Options

1. The water supply option contract, or dry-year option, provides a strategy for temporarily moving water from agricultural to urban uses.

2. This approach is being used on a limited basis to transfer irrigation water in order to provide a secure water supply to nonagricultural water users in times of water shortage at a lesser cost than permanent acquisition of water rights.

3. Under dry-year option contracts, the holder of the option has the right to buy water from the seller, and the seller agrees to make water available in the future under specified conditions and for a specified price.

4. During low water supply years, water is transferred from irrigation use to a higher valued use where it is needed temporarily.

5. The irrigator (seller) receives compensation from the buyer for the temporary use of water, yet retains his water right and the right to receive water during normal water supply years.

6. Compared to permanent transfers, there may be fewer negative impacts on third parties.

7. Agricultural production is maintained in most years so harm to the local community and to the land is minimized.

8. Not all irrigation water rights are equally suited to dry-year options, and not all water supply problems can be solved with this type of arrangement.

9. As yet there are a limited number of examples of dry-year option arrangements in the western states.

D. Land Fallowing Agreements

1. Land fallowing can be practiced in order to make water available for water banks, or for dry-year option contracts, but it can also be the basis for private agreements to make water available on a short-term basis.

2. A water user who has historically irrigated lands can agree to stop irrigating some or all of the lands for one or more seasons, and to transfer the water instead to another water user.

3. In exchange, the water user is compensated typically based on the number of acres fallowed.

4. The user will want assurance that the use can be resumed once the agree-to fallowing period has passed, with no forfeiture of the water right.

5. In contrast to dry-year option contracts which can be triggered again and again, depending on water supply conditions, land fallowing agreements generally begin and terminate on specific dates.

VI. Options for Colorado

A. Preparing for Future Water Transfers

1. Some water will continue to move from agricultural use to urban use and, properly managed, will benefit the state.

2. Colorado law does a good job of protecting the interests of water users but is lacking in a number of other important respects.

3. Colorado law strongly encourages transfers involving the permanent sale of a water right and the permanent dry-up of all of land previously irrigated with that water right.

4. Colorado law provides little incentive to make more efficient use of water under established water rights -- it does not facilitate temporary transfers.

B. Providing Incentives to Save Water

1. In some circumstances it may be possible to meet existing demands supplied by a water right with less water than has been diverted and used historically and to make the saved water available for new uses.

2. Clarification is needed to Colorado law that "saved water" can be made available for a different beneficial use and will not be regarded as "waste" or otherwise made unavailable to the owner of the water right.

3. Incentives to the owner of a water right to take the steps necessary to make water savings would be provided by ensuring that the right to use the saved water has the same priority as the original water right, and that the owner of the water right can make use of the saved water or sell the right to that use to another.

4. At the same time, it is important to clarify the circumstances in which water may be saved and transferred to a new use.

5. Another option is to restrict the right to save water to a state agency such as the Colorado Water Conservation Board.

C. Using Water Banking Mechanisms

1. The water bank offers a number of possible benefits for Colorado.

2. Particularly attractive would be the creation of banks for the major basins of the state, perhaps operated by a committee of water organization representatives and other interests, that could utilize existing storage (including groundwater recharge) within the basin to bank and make available appropriated, historically used, but currently unneeded water.

3. The flexibility with which water could be provided through a bank might help create markets in areas of the state where such opportunities do not presently exist.

4. Banks might also facilitate the development of rotating land-fallowing schemes and dry-year option arrangements.

5. A number of issues would need to be addressed in creating a bank, including how to expedite the transfer process while protecting against injury.

6. Either as a part of new water banking legislation, or in addition to it, the legislature should consider revisiting Colorado law regarding temporary transfers.

D. Addressing Third Party Effects

1. In 1991 the Colorado Legislature for the first time went beyond protection of water rights in water rights transfers and recognized the potential need for revegetation of dried-up lands to prevent soil erosion and build-up of weeds.

2. The Legislature has considered the need for offsetting payments to local governments to make up for reduced property taxes as land shifts from irrigated cropland to dryland farming or grazing.

VI. Conclusion

- Water transfers are a valuable and necessary means of meeting water needs, but they should be utilized only to the degree that they provide real benefits to Colorado and their adverse third party effects can be mitigated.

- Emphasis should be placed on facilitating transfers that do not necessarily require permanent loss of agricultural activity. Colorado should authorize the creation of water banks, clarify the procedure and requirements for temporary transfers, and provide for the transfer of saved water.

- Opportunities exist in Colorado to improve utilization of the state's water resources and to meet the needs of urban areas without undermining the agricultural economy of the state.

- Mechanisms like those presented in this paper provide incentives to make more efficient use of water presently diverted, facilitate short-term transfer arrangements that could address much of the present demand (such as for drought-year supplies), and assure that transfers to not impose uncompensated losses on local communities and resources.

Some References:

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Questions and Answers

Teresa Rice

Q: (Kevin) You talked a little bit about the advantages of a fallowing or short-term reduction in acreage so that water could be used for municipalities. You seemed to indicate that some thought there were benefits to that. On the other hand, the municipalities, as I see it, have the alternative of buying the land, moving the water on a permanent basis, but then at least what we have seen in Colorado is that a municipality, when it doesn't need the water in a given year will lease it back to other farmers or even the same farmers whose land they bought. Why is the temporary approach better than the permanent approach?

A: (Teresa Rice) I think that by buying the land and water and leasing it back they could guarantee that agricultural production could be sustained, that it is just two sides of the same coin. But it depends on who is taking the higher risk, and I think in the case you are describing sustainability is left to the needs of the city rather than any kind of predictability for the future.

Q: (Unknown) Each of these situations is a little bit different and we are learning a lot. Is there a place where that information is being collected so we can gain some of this knowledge?

A: (Teresa Rice) Well, as I mentioned, the Center did a report last year, but as Ellen is very familiar with Areyas and may be a source for the more current information. We haven't kept up with everything that is going on, although when we hear about it we try to update our materials. I think maybe starting with us and then seeing if there are other sources. We have a report and I am sure there are other people who are building on that. When we did it, we were hungry for examples and didn't find a whole lot out there, but I think it is getting better. Ellen may be able to supplement what we found.

(Comment by Moderator) I would be interested to know by a show of hands, how many of you out there feel overwhelmed by the data you are getting? By the data that is presented here? By your ability to get a picture of the entire elephant and not just its tail or trunk? This is one of the major problems that exists in the field we are all trying to deal in -- just trying to read the material that has been presented here is difficult. To read the backup material and use it in an effective way is even more difficult, and Butch may have a kernel of an idea. I am not aware of a central repository for this kind of knowledge. Does anyone know if such a central repository is being built? Perhaps the Natural Resource Center -- is anyone doing that?

A: (Teresa Rice) We do have a list of all our publications, and we often get calls asking, "What do you know about this topic." We are tied into a lot of the people that are doing work in certain areas and we try to provide that. We try to get all our materials on the CARL library system. I know Bob Ward is really making an effort to try and get research to the people who can use it and make this connection between the work that is going on and the people that are dealing with these real problems every day.

A: (Robert Ward) You are right. There is a tremendous amount of information that is coming through. Our institute, the Colorado Water Resources Research Institute, receives a stack of newsletters every month, plus we are trying to digest newspapers and put that information in a form, with research results, that does have some bearing upon particular decisions. I attend meetings like this trying to find out what are the decisions that you are trying to cope with, and we try to take the sources of the Research Institute and put that in a form that helps you wade through all of this and get right to the information you need without having to sort through. You are right, it is a very difficult job, but there are people who are trying to do it.

Q: (Rick Fendel) As I understand the discussion you had about water banking, the basic premise is that you have a supply of water in storage somewhere -- maybe I am missing something, but if you have water in storage why do you need all that other stuff? What does it add to just municipal storage?

A: (Teresa Rice) It's agricultural water -- what we're looking at is banks where it could be any kind of water, but the person who has the right to take it doesn't need it that year for whatever reason. They might fallow their lands and not need it. In Idaho, they have storage rights and don't need them in every year if it is a good supply year. They are willing to put it on deposit so that another entity can lease it for a year, and the state law has been changed so that they are not accusing them of waste or not needing the water and losing it by forfeiture.

Q: (Rick) Let me talk just a little bit about the Fort Lyon Water Bank Study that we did for the Water Conservation Board, which was a multidisciplinary study with a lot of different experts. We found that to do water banking on the Fort Lyon Canal, which is the largest canal in the Arkansas Valley, the concept would be that some of the farmers very much needed to sell or rent some of their water at some times, and there are others in the Valley who would very much like to buy some water at some times, but the delivery mechanism was very difficult. The concept that we ultimately came up with was that some farmers under the Fort Lyon Canal would agree to fallow their lands for one or perhaps two seasons and offer that to the "bank." The bank would then find people who would like to purchase that water for one year or two years up and down the valley. They would match that and then the water from the fallowed lands would be moved upstream through a succession of reservoirs and exchanges. Water banking is very dependent upon the structure of the particular stream system, because you have to find a place to put the water and hold it and then deliver it to people who actually want to buy it. We found that we could do a two-step process in the Arkansas up to Pueblo Reservoir, hold it there and release it as needed to the people who wanted to buy it, and it looked like financially that would work. It would require some changes in ditch company by-laws, some cooperation on the stream and further administrative cost by the division engineer, but it was not a matter of the water already being in storage -- the point was to get it up to a storage point and then release it down to users as they needed it.

(Unknown) Am I correct that the concept, then, is the same thing you were talking about -- managing on a year-to-year basis demand, and removing demand temporarily to create that supply?

(Rick) That is right. Rather than going to a complete removal of irrigation at the Fort Lyon Canal, which had been suggested by a Colorado water supply speculator who wanted to take all the water to the Denver area, it was suggested that maybe we could solve the problems of some of the farmers on the Fort Lyon who needed to sell water by doing a year-by-year process.

Farms and Cities Working Together

Comments by

Bart Woodward

Superintendent, Riverside Irrigation District

We all understood when storage was stopped in Colorado that agriculture became the target. I think you're here today discussing the demise of agriculture, so I think I'll just slap on my six gun and start shooting from the hip a little bit.

Let me talk about agriculture from the perspective where I see it, and I'll try and inject a little bit of Bob Walker into it. Bob is a very unique individual; stubborn as a mule, very inventive, and a tremendously hard worker with a lot of good ideas. Bob comes from a farm that's out on top of a hill. There are no ditches that run into his farm; he operates with wells, extracts his water from the underground, and therefore he is very junior. Bob always likes to talk about water management, and he and I have spent many a cup of coffee talking about water. From his perspective, water management is how he can get hold of my water; and from my perspective, water management is how he can get hold of my water. Water management all depends on where you are in perspective of the priority system. You talk to a senior water right holder about water management and he knows what you are up to. It is a way that you can extract some of his water and he won't miss it -- you've got to put that into perspective. I think I'll go home and see if I can't organize the rest of Morgan county into a city, all the unincorporated parts. We can have a city council; we can put ourselves on a level playing field; we can have zoning rules of our own; and we can count as a city. You know, the only line that is respected by a city is another city's line, and they fight over that occasionally. Maybe we'll just turn the rest of rural Colorado into one big city, so we have a little bit of perspective and 1041 powers of our own. I don't know why storage has become such a villain in the State of Colorado.

I want every one of you to look right in front of you. There's a little storage vessel right smack dab in front of you. Why do you have that little cup there? It's to provide water when you need it. Now there's plenty of water around; in fact, there's water in this atmosphere. Why isn't that good enough? Why do you need that cup? Why do you need that bottle? You bikers that take off down the bike path, why do you carry that plastic jug with you? That's just simple storage, having the resource available when you need it. If you live in a desert, and that's what Colorado is, you'd better store water. If you don't want to store it on the surface you'd better store it underground or it isn't going to be there. There is no magic; you can't make it rain and you can't make it snow any more than it has historically.

There is nothing wrong with storage, if this is the type of lifestyle that we want to perpetuate (you can raise a good question about that). I remember an illustration an old preacher gave. He came to this little farm set out in the country. This farm was immaculate: it had no weeds; it had green crops; it had white picket fences; it had painted buildings; it was a showplace. The preacher said, "Boy, God really did a good job here, didn't he?" The old farmer said, "Yeah, but you should have seen this place when God had it all by himself."

I don't see anything wrong with agriculture. I think it has provided a service. Another thing I hear a lot about is subsidies to agriculture. You know, if you want to dig down into the financial reaches of your newspaper and look up on an annual basis what agricultural debt does, you know it goes up every year. That means the farmer borrowed more money and mortgaged his land to a higher extent to do what? To grow a crop for you. Who's subsidizing whom? They get a pittance from the government, called a subsidy, and I don't like it. I would just as soon it wasn't there. If you look at the record of who votes for the farm program, there aren't enough farmers in Congress to pass it. You know who passes the agricultural subsidy bills? It is Detroit, because they know if you pay too much for food you can't buy a new truck, or pickup, or new car, or a new washing machine. Don't kid me about subsidies.

There are a lot of environmental groups out there. If you want to talk about subsidies, let's talk about you. You collect money, but you don't pay one thin dime of taxes on that money. It seems to me that's a little bit of a subsidy. I pay taxes on the money I take in. I even pay taxes on money I get from the government, but you don't. How's my six gun going?

There is cooperation out there, and we're going to make it together or we're not going to make it all. If you think we can continue down this path without new storage you're wrong, but we have been careless in the storage that we did. I like a beautiful trout stream and I don't like to see it inundated, but out on the prairie we have built beautiful wetlands with agriculture, and we did it with storage. Right below every irrigation ditch there are beautiful little draws that were not there before, and they support all kinds of waterfowl and plant life that before had not been there. So there's a lot that can be done. I think you're going to have to bite the bullet if you want to continue. I am not willing to give up my farm. I still live in Snyder. In fact, I live an eighth of a mile from the house I was born in, and probably one of my kids will live there a while after I am gone. So we're there and we are there to stay because we have grown roots. If you trample on those roots too hard we're going to resist, but we know that we're part of the whole picture and we know that there must be some cooperation.

Our system owned 6,000 units of the Northwest CWCD project up there. We were so far down the river that it couldn't get it to us, so we rented it back to municipalities. In fact, we sold it to a municipality -- actually, we optioned it. We took all but one dollar of that option and we still own the water. Someday they'll give us the last dollar and take the water, and if Northern can get its pipeline done, it will pipe it into the city and use it for drinking water. But we took that water and we built a reservoir. Because our system was so water-short, our farmers were trying to grow crops on one acre-foot and that was at the head gate. They had to stand all the loss after that. Agriculture does not have an overabundance of water. Don't look to agriculture to solve your problems. You have to look to storage somewhere, somehow -- new storage, inventive storage. If you don't want to dam a mainstream, then build your storage some place else, that's the answer. Now here again, I am probably talking a lot about the South Platte, but I think it is universal around the state. I think Colorado agriculture is part of this state and I think we're going to be part of the solution. But you have to be part of the solution also. Bite the bullet and find some inventive ways to store some of this resource, or it isn't going to be there. It's as pure and simple as that.

Farms and Cities Working Together

Comments by

Carol Ellinghouse

Coordinator of Water Resources
City of Boulder

Have you noticed that agricultural water users seem rather worried lately? It doesn't seem that there will be any approval of new water storage projects, and we are told that that is okay -- cities can just transfer some agricultural water. The largest landowner in Colorado, the Federal Government, is rising up with demands for more water supply for *its* purposes and is trying to use federal regulations to take a portion of existing municipal water supplies. Some of the federal staffs say that "We can just transfer water from agricultural uses to meet the municipal demands."

People concerned about the environment are asking for changes in how we develop new water supplies. Some of them ask, "Why don't you just transfer water from agriculture instead?" Journalists label agricultural uses wasteful and uneconomic and talk about moving water to higher economic uses. It is enough to make an agricultural user a little bit nervous. If they voice their concerns, they are sometimes labeled just another over-subsidized special interest group.

Why do Colorado municipalities care about what happens to ag users in the state? This wasn't so much of a question when cities grew more slowly and absorbed the agricultural land immediately surrounding them, converting the agricultural water from these lands to meet their water needs. But now we have larger cities, reaching beyond their geographic boundaries to acquire and convert agricultural supplies in areas to which they have no strong economic or cultural ties. When they do target out-of-basin agricultural supplies, it is often the highest priority water and the most productive agricultural lands, because this produces the most transferable water. Communities in the areas that have been targeted have awakened to the degree to which they are dependent on a healthy surrounding agricultural economy and to the extent that the surrounding agricultural lands and flow in the adjacent streams create a sense of the community.

So, how do communities protect themselves? What kinds of actions can they take? The actions can be defensive or offensive. It is better to be on the offensive. An important first step for a community is to define what the community really wants to be. It is important to be realistic in this definition. If the community is counting on absorbing the surrounding agricultural lands and their water supplies, they had better develop a plan to get there first. A realistic look at the economic potential of the surrounding agricultural lands is called for. The Soil Conservation Service rates the productivity of agricultural lands according to the standards of lands of national significance, lands of statewide significance, or lands of local significance. Some lands are highly productive and farmers should be encouraged to remain in agriculture, but on some lands -- let's face it, the prairie never should have been broken. The soils are too poor, the climate is too harsh, water supplies are too scarce, or the agricultural production results in too much environmental destruction.

Communities need an honest evaluation of the future of their surrounding agricultural lands. It may be that the economic future of the community lies elsewhere. It may be that the community will thrive in conjunction with its surrounding agricultural base. What we are talking about here is something that Teresa Rice alluded to, and it is a concept that often invokes discussion of the 5th amendment -- takings -- the concept of land use planning.

Now, what can you accomplish with land use planning besides getting everyone all riled up? I am not suggesting that all communities should take land use planning to the level of art form that Boulder has, but a lot can be gained from land use planning. You can open discussions within your community. You can develop an idea of what the future of the community will be. You can raise questions that need to be answered. You can begin a dialogue about what you want the future of your community to be, building some common consensus and removing some of the suspicions between the community and the surrounding agricultural users.

A land use plan or a management plan must be flexible and subject to change to be of any use. It cannot be a rigid document set in stone. Let me give you warning that if you start in on land use planning it only leads to more planning. In Boulder, it has led to master planning for all of the major city departments. We have a transportation master plan, a housing master plan, a parks master plan, and just within Utilities we have a raw water master plan, a treated water master plan, and a wastewater master plan. If anyone is interested in the master planning process and how it can be used to develop consensus within your community, I have co-authored a paper that was previously presented at the annual AWWA conference on this topic, which is available in the lobby.

What good is master planning? Will it result in documents that are used, or will they just sit on a shelf? The Boulder Valley Comprehensive Plan has within it a goal that I would like to read to you. It is expressed as follows:

> *The City shall consider the importance of other objectives of the comprehensive plan in its water supply plan and operation decisions. These shall include instream flow maintenance, enhancement of recreational opportunities, water quality management, preservation of open space and irrigated agricultural land, and implementation of desired timing and location of growth patterns.*

The City translated this goal from the Comprehensive Plan into several, more specific objectives within the Raw Water Master Plan. One of these objectives was the maintenance of agricultural land uses in the Boulder Valley.

Boulder has historically employed one strategy which is commonly used by municipalities throughout northeastern Colorado, and that is leasing of supplies on an annual basis when they are not needed for municipal use. These supplies are leased to agricultural producers, specifically to help them remain viable as a land use, particularly within the Boulder Valley. The water supplies are leased fairly inexpensively, and frankly, it is a subsidy.

So, why should we subsidize agriculture? In the U.S., the historic policy of subsidizing agriculture arose during the period when we were a nation of immigrants. When many immigrants arrived, frankly, they were not very healthy, so the goal was to produce a large, healthy population. Anyone who has seen the prices in a grocery store in Canada or tasted what passes for beef in Europe knows that Americans have an abundant, cheap and high-quality food supply due to our historic policy of agricultural subsidies. Maybe our food supply is too good. I was reading in the *Denver Post* last week that we have gone from 25 percent of our population being obese in 1980 to 33 percent in 1994.

Many people are calling for revisiting our policies of agricultural subsidies and perhaps their elimination. This may be the case -- that it is needed where agricultural practices have caused severe environmental problems due to use of marginal agricultural land. But maybe there is a new reason that we should consider for subsidizing agriculture which rises out of environmental and land planning concerns. This reason would be the preservation of the character of our Colorado communities -- not just our cities, but our communities -- by preserving the surrounding greenbelt. This approach must be done in conjunction with environmentally sound farming practices to achieve its goal.

In the book Dakota, A Spiritual Geography, the author talks about the sense of place and how people are shaped by where they live. In Colorado, our land use is very much tied to our water use. By extension, our water use also gives us this sense of place.

In Boulder, we have done these exercises in land planning, and what we have concluded is that the agricultural greenbelt surrounding our city is very important to the identity of the city. We have also concluded that, given the value of land in Boulder County, the agricultural greenbelt is not going to be maintained on its own. This is an area where water policy can complement other policy areas and further the goals in the Boulder Valley Comprehensive Plan. It requires stepping beyond the techniques of annual water leases to do something a bit more. The City of Boulder open space program has acquired a lot of the agricultural lands surrounding the city using funds from a voter-approved sales tax. Much of the open-space land is kept in active, agricultural production, but the city cannot buy all the agricultural lands. One method of encouraging the private agricultural producers was proposed in Boulder's Raw Water Master Plan. This is the concept of an interruptable water supply contract. Teresa Rice described this approach in her discussion on dry-year options. How can interruptable water supplies fit into a municipality's water system? Again, it comes back to planning. A city must know how it will grow in order to

determine its future water needs, and it must know the reliability of its water supplies and its ability to endure shortages.

Planning is no guarantee, with fluctuating growth rates, ever-changing federal requirements threatening the existing water yields, and the uncertainty of drought. It is in this area of drought protection that interruptable water supplies can come into play. The increment of water supply held for drought protection by cities is often the most expensive for the city, and it is not needed in most years. Through interruptable water supply contracts and adoption of reliability criteria for the water supply system, cities can address their infrequent water needs less expensively and without permanent and unnecessary dry-up of agricultural lands.

Since the time of the raw water master plan adoption by the Boulder City Council, the city staff has been working toward the goals contained in the plan. We recently completed our first interruptable water supply agreements. Because this type of arrangement commonly has not been done before in Colorado, I would like to report on our process and some of the pitfalls that we ran into.

We began our process by meeting with the agricultural users on the local ditches to discuss the interruptable supply concept. As discussions moved from general to more specific over a period of years, some degree of commonality began to develop that had not been there before. When a block of shares for which the interruptable supply concept would work became available to the city for purchase, the building blocks for an agreement with the ditch company were already in place.

During this period, the city had established some reliability criteria for the water distribution system. These defined the frequency at which the city was willing to endure shortages. The criteria consisted of a three-tiered water supply reliability policy:

> A thousand-year drought standard for water uses deemed essential for basic public health, safety and welfare. In other words, basic water needs would not be interrupted any more than once in every thousand years.
>
> A 100-year drought standard for that increment of water use needed to provide continued viability of outdoor lawns and gardens. We would be willing to let our landscaping die once every 100 years.
>
> A 20-year drought standard for that increment of water needed to fully satisfy all municipal water demands. Water restrictions would not be required more than once every 20 years.

Because interruptable water supply contracts commonly had not been done in Colorado, there were still a lot of questions. Many of these questions concerned the form of ownership of the shares. Would they be owned by the city or would they be owned by the agricultural producer? Other questions related to the frequency of interruption and how to define it in terms of drought; how to assure continued agricultural use when it was not interrupted by the city; obtaining the State Engineer's approval of the changes in use, particularly during a drought year when the city would need it most; how to value the purchase; and what the payment to the agricultural user would be in years when the interruption was done. It is likely that every community would resolve these questions in a different manner for its interruptable water supplies.

Because interruptable supply agreements are not common, Boulder chose to take a careful approach on this one in order to protect its investment. This was an experiment for us. The shares were purchased outright and then leased back on a perpetual, but interruptable, basis for use on open-space land owned by Boulder County. Boulder will transfer the shares to include municipal use through the water court. Perhaps, in the future, water law will evolve to give more confidence that temporary transfers will be allowed, as Teresa Rice suggested. But for now, because it is not in place, we chose to take this method. We worked out a substitution agreement with the Northern Colorado Water Conservancy District to make use of existing infrastructure to deliver the water to the city, rather than building new infrastructure. Eric Wilkinson will probably go into more detail on this in his presentation.

Interruptable water supply agreements are no panacea. They will not solve the metro area's water problems; they will not be a mechanism that can completely protect agricultural greenbelts around towns from other marauding cities. To solve the state's water supply problem, we will need to address it comprehensively together and not try

to push the burden completely out of our own back yards. The ostrich approach may result in some very undesirable solutions. We can't ignore the metro area need for water and pretend it doesn't exist, or we may end up in an expensive, nonproductive, defensive position. Taking the offensive and working with the metro area to design water supply solutions that are compatible with the needs of other Colorado communities may be the best way to protect our agricultural users. But if the federal government is saying, "Not in our backyard," and some environmentalists say, "No new storage," the ag users will continue to be the easiest target for new municipal water supplies. While we can certainly do a great deal more in the improved management of existing water supplies including short-term transfers, water banking and conservation, eventually these techniques will reach their limits.

Perhaps it is time to start looking at demand management more broadly than just defining it as conservation. Recently, the idea of statewide land planning has evolved from "radical" to "worthy of consideration." Even the Honorable Senator Hank Brown has suggested a state land planning process. Recent growth pressures and water development proposals in the state have caused us to sit back and ask, "What do we really want for the future of Colorado?" Will it be wall-to-wall people? I would hope that we begin to recognize the value of our agricultural lands as something more than a water supply source for our cities.

Farms and Cities Working Together: Fundamentals of Cooperation on Farm to City Transfers

Eric Wilkinson

General Manager
Northern Colorado Water Conservancy District

Several of the Front Range cities within the Northern Colorado Water Conservancy District are beginning to realize the importance of agriculture, not only to the economy but also for the maintenance of open space and the environment that surrounds the Front Range cities. Within the District there have been examples of cooperation between the agricultural sector and the municipal sector for years. Cooperation is improving because there is a goal to make maximum beneficial use of existing water supplies as well as existing facilities.

We have an extensive rental market within the Colorado-Big Thompson Project as well as the Windy Gap Project. We also have rental markets within many ditch systems that the agricultural community utilizes, made possible by the municipalities making municipally owned water within the specific ditch companies available for use by the agricultural producers. As Carol Ellinghouse stated in her presentation, the City of Boulder has now implemented interruptible water supply contracts, with that option being investigated by several other municipalities. Substitute water supply agreements have been in existence in our District for several years within the agricultural sector. Those agreements are now branching out to jointly incorporate the interests of both the municipal and the agricultural sectors. We also have extensive use of lease-back agreements between municipalities and agricultural interests on water rights that have been acquired by municipalities as part of annexation agreements.

In addition to all these things that are now being implemented, we also have some proposed projects and studies underway for cooperative agreements between municipalities and agricultural entities. These include the interruptible water supply study that Ellen Pinnes is doing on the Colorado-Big Thompson Project and Windy Gap Project supplies. I encourage you to listen to her presentation in the session that follows this one.

We are studying wellhead protection programs in our area as a cooperative effort between conservancy districts and municipalities, whereby managed recharge could be used to help protect municipal wells against possible contamination.

In 1992, the District filed eleven water rights applications in Division One Water Court for a project we call the South Platte Water Conservation Project. That project incorporates several concepts of cooperation between agricultural and municipal water users to beneficially use unappropriated water in the South Platte Basin.

There are several benefits from cooperation between the agricultural and municipal sectors. They include realizing the maximum beneficial use of available water supplies and existing structures; the prevention of adverse impacts to the environment, the tax base, and the economy caused by the permanent transfer of agricultural water rights to municipal use; and facilitating the necessary and extensive planning between agricultural and municipal users necessary to build needed infrastructure. Yes, I did say infrastructure, because sooner or later it will be realized that infrastructure will be needed to meet the demands of the future as well as to manage the conserved water supplies that people are talking about today.

The rental markets in the Colorado-Big Thompson Project are unique to the Project, as are the rental markets for the Windy Gap Project. As you know, the water sources for these two projects are the headwaters of the Colorado River, making those waters transbasin waters within the South Platte River Basin. Therefore, those waters can be easily moved to any water user within our District boundaries for beneficial purposes. The extensive rental market that we have within these projects allows water to move on a yearly basis to the areas of highest need. Some years that movement is from municipal to agricultural use, and in some instances it has been from agricultural to municipal use.

To give you an idea of the extensive nature of this rental market, in 1991 the net shift from municipal to agricultural use was about 19,000 acre-feet; in 1992 it was 8,500 acre-feet. This year, because of the dry weather

and water shortages, we have already experienced in excess of 15,000 acre-feet moving from municipal to agricultural purposes. There are also provisions within our contracts with the United States for the transport of our Windy Gap Project water through the Colorado-Big Thompson Project and to make excess Windy Gap Project water available to Colorado-Big Thompson Project water users, with the assumption that the excess Windy Gap Project water takes on the identity of Colorado-Big Thompson Project water when utilized in this way. In other words, the return flow obligations associated with the Colorado-Big Thompson Project, including dedicating the return flows back to the stream for downstream uses, applies when excess Windy Gap Project water is rented within the Colorado-Big Thompson Project. In 1993, we had a movement of about 10,000 acre-feet from the Windy Gap Project to agricultural uses, and this year we have had a movement of 13,000 acre-feet.

Another option for cooperation which has significant future potential is interruptible water supplies. This option preserves a viable agricultural economy and the continuation of open space but allows water to move from agricultural to municipal purposes in drought situations under the terms of the interruptible contract. The City of Boulder has utilized this option to maintain open space as well as to provide drought water supplies to the city. The Northern Colorado Water Conservancy District, through a grant from the Colorado Water Conservation Board Water Conservation Fund, is now studying the possibilities of interruptible water supplies for Colorado-Big Thompson Project allottees. Ellen Pinnes is conducting that study, looking at the possibility of shifting water supplies on an interruptible basis from the permanent allottee to water users that need water in times of drought. I think there is a great potential for this. It is specifically being studied for the procurement of drought water supplies, as well as to provide Windy Gap Project participants a way to utilize water in the integrated operations of the Colorado-Big Thompson Project and Windy Gap Project.

Substitute water supply agreements, another area of cooperation between agricultural and municipal users, is a concept that has been used historically within our District boundaries. Agriculture-to-agriculture substitution or exchange plans have been in existence in the Poudre Basin, some people say from the beginning of time. Substitution and exchange plans allow the maximum utilization of available water resources. In some cases, as many of you probably know, there are irrigation and reservoir companies within the District boundaries that own reservoirs that are physically located below the companies' systems. The only way that they can use that water resource is by substitution or exchange. Historically those types of arrangements have been used to the maximum benefit of the area.

Carol Ellinghouse alluded to a recently completed substitution agreement between the City of Boulder and the Northern Colorado Water Conservancy District. This is a integral and necessary part of the interruptible supply contracts that the City of Boulder has entered into in the Consolidated Lower Boulder Ditch System. The agreement allows the City of Boulder to use its interruptible supplies to provide water to Colorado-Big Thompson Project allottees in the Boulder Creek drainage, and in exchange receive a similar credit for the Colorado-Big Thompson Project water in Boulder Reservoir that would have otherwise been delivered to the allottees. That substitution agreement allows Boulder to "reposition its water" within the Colorado-Big Thompson Project system, specifically Boulder Reservoir, so it is usable within its municipal system. One of the considerations of a substitute water supply contract that is of concern to the water users as well as the District is the quality of the substitute water. Does it adversely affect the ability of the agricultural community to use that water as the substitute water supply? That was one of the major topics of discussion when the District considered and eventually approved the plan of substitution with the City of Boulder.

Another type of cooperative agreement that exists between the municipal entities and the agricultural entities is lease-back agreements. Many municipalities within the District have annexation water requirements. In other words, when you annex land into the city you bring with that land a certain quantity of water per acre. For example in Fort Collins, it is 4 acre-feet per acre. In lieu of dedicating that water to the municipality, you can pay a "cash in lieu" payment. The city then uses these funds to procure the necessary quantity of water. Whether that water is acquired through a purchase or by transfer, much of the land that is annexed to these cities will not be fully developed for quite a few years into the future. The cities have made provisions for lease-back of that water, again, to keep that agricultural economy in production, until that land is actually developed and that water is needed for the municipal water supply to serve the annexed area. A prime example of this is the City of Greeley. Not only did they use money that they acquired from the "cash in lieu of water" funds, in 1991 they also floated a bond to buy additional water in the Greeley-Loveland Irrigation Company and associated companies. The lands on which the acquired water was used are lands that will probably be annexed in the future during the City of Greeley's urban

growth. Greeley has developed long-term, in some cases up to 20-year, lease-back agreements with shareholders under the Greeley-Loveland system. These lease-back agreements are now yielding about 4,200 acre-feet per year. That water will eventually become part of Greeley's municipal water supplies. There are other municipalities within the District that are investigating these possibilities and are implementing them.

Entities are cooperatively looking at wellhead protection programs. This is a cooperative agreement between Central Colorado, Lower South Platte, and Northern Colorado Water Conservancy Districts and the towns of Brighton, Fort Lupton, Fort Morgan, and Sterling. Study participants are looking at regulations regarding municipal wellhead protection and are taking a proactive role to protect the quality of water at those wellheads. This proposal involves cooperation among municipal and agricultural water users, utilizing managed recharge to mound groundwater in the area around those municipal wellheads. Higher quality spring runoff water is used for this mounding by managed recharge, and that recharge water is carried through agricultural conveyance systems. Through cooperation between the agricultural sector and the municipal sector, there are benefits to both sectors. This type of wellhead protection is a proactive way of addressing possible water quality concerns associated with practices of irrigated agriculture.

Another proposal being investigated is water banking, including the pooling of water supplies and water rights. One thing that has been talked about in northern Colorado in regard to water banking is the acquisition and pooling of base supply water rights to preserve them for the future, preventing an acquisition by outside entities coming into the area to buy water rights and possibly transporting them out of the area. This is a very expensive proposition and that is probably why it has not been pursued. There are other options being kicked around along the same lines, including procurement of first right of refusal. Entities that are interested in preserving the future water supplies for the area can buy the first right of refusal on particular water rights. If there is an interest shown or offer made on those water rights, that particular municipality has the right to either not exercise the option or to exercise that particular option to assure that water right remains in the area.

The last proposal involving water user cooperation that I would like to discuss with you is what we call our South Platte Water Conservation Project. This project entails the diversion of unappropriated water, or waters that could otherwise be lawfully diverted, from either the South Platte River or the Poudre River near the confluence of those two rivers, and through a series of interditch exchanges and river exchanges, repositioning that water higher in the basin or within the Colorado-Big Thompson Project facilities for use along the Front Range. That repositioning would be done by using the unappropriated waters that would be diverted by the project from these two rivers in interditch exchanges with those canals that lie north of the Poudre. The project's water supply would be substituted for waters that would otherwise be used by those irrigation companies to satisfy the needs of their shareholders including surface water, storage water, or Colorado-Big Thompson Project water. Participants in the project could then directly utilize or store a like quantity of the higher quality water that these irrigation companies have historically diverted and used. This storage or direct use would be in available facilities, in new facilities, or within the Colorado-Big Thompson project by exchange, making the higher quality water available for a multitude of additional beneficial uses. This type of project obviously would take a great deal of cooperation between the agricultural and municipal sectors, but it would greatly benefit the area by making use of unappropriated waters and increasing the amount of high-quality water supply available to District entities.

In closing, cooperation between the agricultural and municipal sectors is definitely an ongoing proposition and hopefully will continue, leading to the betterment of the area and the maximum utilization of our resources. It is an essential part of sustaining the agricultural economy in our area. With local interests working together, I feel that we can cooperatively address the many issues we face and can avoid the adverse impacts and fragmentation that could result from non-cooperation. The underlining concepts that must be followed are concepts that are mutually beneficial to the entities involved and that avoid injury to vested water rights.

Farms and Cities Working Together: Fundamentals of Cooperation on Farm to City Transfers

Comments by

Kevin B. Pratt

Attorney

First, let me talk just a bit about water salvage, because that is an issue which needs more clarification, even though it has been talked about a fair bit today. When water goes into the headgate of a ditch, that water goes to one of four places.

First, it goes to a crop for that crop's consumption; that is the ordinary beneficial use. Beneficial use is why you put the water in the ditch in the first place.

Second, a lot of that water seeps into the ground and returns ultimately back to the stream as return flows. On the South Platte and the Arkansas Rivers, the downstream users rely on that return flow and have always relied on it. You can't take that away from the people downstream. It is not fair to them.

The third place that water goes is to evaporation. That is a loss you can conserve. But it may not be feasible. Let me let talk about the Fort Lyon Canal. The Fort Lyon Canal is half as wide as this room; it is as deep as this room; it runs for 110 miles. Who is going to pay to line it, cover it, or to prevent the evaporation out of that canal? It is not possible financially.

The fourth place that water goes is to grow weeds. You grow a lot of weeds under a ditch, along the ditch bank, and along the edges of the fields. Some people call those weeds green belts, and other people call that wasted water. Maybe there is an opportunity to make changes there. But, what are you going to do in order to permanently salvage that water and use it for some other purpose?

The concept being kicked about is: let's give somebody a permanent right to that salvage water and then they can sell it. That is a great concept, but how will it be implemented? Are they going to spray herbicides on the weeds? Are they going to put plastic over the weeds? In ten years what is the situation going to be out there? One of the immense problems with a water right for salvage is maintaining the permanence of that salvage. A lined ditch cracks, seeps, and loses water. Weeds killed once, at least in my yard, come back very quickly. In a water-short system, such as in the Arkansas Valley, farmers are already short on water. They have already seized opportunities to improve their efficiency and put more water on the crops. That is something they have done for many years. There is no other farm practice which is technologically available and economically feasible today which would enhance the use of that possibly salvaged water.

Let me turn to a different subject -- the cooperation aspect of innovative water transfers and the opportunities for farmers, cities, and governments to work together. There is a very human side to that cooperation, and that human side needs to be kept very much in mind. There needs to be a pusher, motivator, facilitator, or somebody who is ready to get out in front and try to put together some kind of improved water project. You have to have one of those people to get going. In the rural community, by and large, there is a lack of leadership skills. The people who can really put together a project or program, get it organized, and work with other entities to reach a mutually advantageous outcome are a limited group. We need to build that leadership, in the high schools and on up.

Then, who shows up at your negotiating meetings where you are trying to reach solutions through cooperation? I would submit to you that every major entity in this state has personnel who take the roles of the bad cop, who adamantly will not compromise, and of the good cop, i.e. the nice facilitator who would like to work cooperatively to put a project together. You'll find both kinds of people showing up at your meetings. You know whether or not an entity really wants to cooperate with you, based upon the kinds of people that entity sends to the meeting, (and thus, the kind of progress you make).

There is one other important point I want to make. I would submit to you that the water court system is

an excellent system, because it forces the best way to resolve conflict, which is through cooperation, negotiation, and ultimate resolution. The speaker at lunch spoke of instances where in order to do a certain thing with water one needs 450 approvals from the bureaucracies. At least with the pressure of the water court process hanging over your head, you have an ultimate, unbiased decision maker who will give you a decision one way or the other.

The other advantage to the water court system is that it's there solely to make a decision, to resolve a problem. The bureaucracy, be it EPA, or the Bureau of Reclamation, or the state, always seems to want to grab a little bit as you go through their approval processes. For example, the Bureau's Conservation Guidelines are headed in the direction of requiring anyone who wants to receive Bureau water in the future to kick back part of it. You don't see that in the water court.

(The following is from written materials presented at the conference)

When a farmer sells water to a city, it can be a tough decision with lots of emotions attached.

About selling the farm this summer to the City folks.

I like living on this farm where I live right now.
I wouldn't budge for a buck.
Yet, the work is hard and the kids are gone
And every year I'm pushing my luck.

So maybe I'd listen (if you sweeten the offer)
And treat me decent and buy me a cup.
Yes, if the price was right, I might think real serious,
Might talk to my lawyer, might take you up.

Still, I'm wanting to know, 'fore I leave this to weeds,
If moving now isn't corrupt.
While you've painted on rainbows to the end of my dreams,
This chopping out roots seems abrupt.

I know when the neighbors hear the offer you've made,
They'll be bobbin' and squawking like ducks.
But, I figure one sells when there's money a buying
A farmer needn't mimic an ox.

Sure, folks might imply that I've gulped down a lie,
That I'm petting the devil's pups.
But today, the water's behind and the wind's panting hot.
I quit. I'll be packing the truck.

I. There are certain fundamental facts which sometimes are forgotten in the emotional debate about water transfers.

Fundamental facts:

1. When your horse stands on the bank of a Colorado river in early June and sips the water, the water is free; otherwise, water is not free.

2. Because water in Colorado can be transferred to different uses in different places, economics drives current use and changes to future use.

3. Cities and industries can afford to pay more for water than agriculture, so the market allows them to have as much water as they need.

4. Cities and industries need only 10% (or less) of the water used in Colorado.

5. Of the surface water available in Colorado, over 800,000 ac. ft. is unused in Colorado. This water is available for "free," but no one wants it because the cost of transporting it to the place of use is more than its value at the place of use.

6. The value of water to a farmer relates to three things:

   a. The price he gets for his crop production.
   b. The other costs of production.
   c. The return available from other investment alternatives.

7. The value of water to a city relates to two things:

   a. The demand for water in the city (which relates in part to the price to the consumer).
   b. The cost of delivering the water to consumers.

8. Within a given ditch system, "removing" some water affects other shareholders adversely.

9. Return flows are the source of water for the more junior ditches taking water at any instant. Any "salvage" or "conservation" of the return flow component of historic diversions hurts junior users.

10. The natural hydrologic flows fluctuate massively through the course of a year and of a century.

11. Storage is necessary for any use in low flow periods. The suggestion that wetlands would take care of storage is absolutely naive. Look at the Arkansas River. It would dry up in late summer in the 1880's, even in light of whatever historic wetlands there were.

12. Every upstream junior water right, whether diverting from the stream or an instream diversion, makes it more difficult to transfer water to a new use or diversion upstream.

13. The priority system requires a water right owner to look out for his or her own interests -- to be sure a junior is not getting water, and to be sure a senior is not getting more than the senior is entitled to. Using a water court or a water czar, using total administration through an administrative agency, or even doing away with engineers and lawyers will not prevent a water right owner from having to be continually vigilant to protect his or her water rights.

14. Today there is no consensus about <u>what</u> role government (executive, legislative, judicial; federal, state, local, special) should have in water resource management. (Every water user would like very cheap water, but there is a consensus that rules to prevent simply stealing water from other users are proper, so there is a consensus that government has some role in water management.

II. Farms and Cities working together

The basic rule of non-injury mandates some cooperation and accommodation among new and old users. Since one can only change the use of water so long as one does not injure other persons who own water rights, the interested parties must deal with each other's interests during the water court process.

By a settlement during the water court process, typically each side comes out ahead because the person wanting to transfer water obtains elements of certainty and the person wanting protections from injury obtains certainty of protection, and perhaps protections of a different type than a water judge would decree.

The water court process is crucial to encourage settlement. The water court process means that if the parties do not reach a settlement, a neutral decision maker will issue a definitive decree based on fairly well-established rules within a relatively short time frame. (Some persons assert that without the pressure of the water court process, government agencies might never reach a final conclusion in review of water change applications.)

III. Examples of cooperation with and against cities (from the Arkansas Valley):

(Kevin B. Pratt has been an attorney for a major player in each of the instances discussed.)

Rocky Ford Ditch Transfer

The City of Aurora desired to purchase a majority interest in the Rocky Ford Ditch for eventual exchange upstream to a diversion point from which the City could pump into the South Platte basin for delivery to the City.

Extensive settlement discussions during the pressure of trial resulted in a settlement which included leaving water in the ditch to protect remaining minority shareholders, limiting when and to what extent water could be exchanged in order to protect upstream diverters and wastewater discharge points, requiring revegetation to protect neighboring farms, and requiring contribution to the costs of state administration of the decree provisions.

Winter Storage Program

The thirteen major irrigation ditches between Pueblo Reservoir and John Martin Reservoir on the Arkansas River desired to store winter flows for more effective use during the summer. The Bureau of Reclamation's declaration of how the program must operate was rejected by the ditch companies, who over eight years developed and tested and renegotiated how the program would work before seeking a water court decree.

City users of upstream reservoirs joined the program when the ditch companies decided to accept a more junior date for the change decree, allowing more storage in the cities' reservoirs. Downstream users were given assurance that winter flows which had traditionally reached them would not be reduced.

FLOW

When a speculator (CIG) offered to buy a majority interest in the Ft. Lyon Canal Company, the largest company in the Arkansas Valley irrigating 93,000 acres, it proceeded hostilely.

The community responded to block the speculator on various fronts, and was ultimately successful. Ditch shareholders who felt that the speculator was not interested in sufficient protections against injury, formed FLOW to scrutinize the proposal. Local governments formed Task Force I and II to act to protect local economic and governmental interests. The Governor and the CWCB urged development of alternatives to the CIG proposal.

The lack of cooperative approach ultimately defeated the CIG proposal before shares were purchased.

CWCB Water Bank Study

As an outgrowth of the CIG attempt to take over the Ft. Lyon Canal Company, the CWCB commissioned a study of what alternatives would help avoid a repeat of the CIG type effort. The multi-disciplinary study team concluded that a local water bank (of about 5,000 ac.ft.) would help keep water for use in the basin by giving farmers who were particularly interested in selling a local market, and by allowing agricultural water to be used for local commercial, municipal and industrial uses.

The water bank operation needed to be customized because of the specific details of assuring non-injury in the local area -- use of reservoirs to store water bank water needed to respect preexisting rights, and exchanges to storage or to users would need to occur when river flows would allow it. For example, it turned out that the Winter Storage Program winter operations would allow exchanges to storage which likely could not have occurred without it.

HARP

Almost all the water used by agriculture in the Arkansas Valley flows through the river bed in the City of Pueblo. Part of the water for a stretch in Pueblo also runs through the Westplains power plant for cooling and is returned to the river several miles downstream.

The City plans to expand the power plant cooling channel for a large city center water park (the "Historic Arkansas River Park," or HARP) and to increase the flows through the new park. The increased flow rights will have several important effects: water quality in the main river channel will be reduced for one diverter; future exchanges which might occur with future downstream ditch sales to cities will be inhibited; the incipient water banking opportunity will be reduced. The City recognizes the various interested parties and is negotiating with them in hopes of benefitting from the agricultural flows, while not adversely affecting farmers.

Q. (Jeanie Bolton) I wonder about salinity in return flows as it relates to the interrupted use from agriculture to municipal to agriculture. Do you see this as something that is measurable, or is it going to be a part of your interrupted water supply agreements? How is salinity treated in that respect?

A. (Carol Ellinghouse) I know that at least one of the agreements that I talked about had provision in there for monitoring, and NWD had to pay the costs of the consultants. I am sure they were monitoring quantity, but they may have also been or could also incorporate conditions or provisions to require water quality monitoring, if that was a concern. I am not sure if they did in those particular cases.

A. (Eric Wilkinson) Under interruptable supply contracts, the water would probably move from ag to municipal, obviously. The return flows would have to meet the discharge standards that were prevalent at the time that water was used--discharge standards by the municipalities. Shifting back then to agriculture, right now there are no discharge standards, at least on nonpoint source pollution. There are our best management practices being proposed under the Clean Water Act and so forth, but those are yet to be implemented or even yet to be formulated. So right now salinity as such probably would not be an issue that I could forsee in these interruptable supply contracts.

A. (Kevin Pratt) Let me give you an example of where the rubber hits the pavement. In the Wolford case, which is the reservoir being developed at Kremmling with funds partially from Northern and partially from Denver, a water decree was required in the court. The users in the Grand Junction area, Clifton water district in particular, raised the issue of salinity in that case as a detriment. They raised the issue of salinity to the degree that it was not measurable. There is no measuring implement that we have that we can use in that river that would measure the salinity that they propose might damage them. In a water court setting, you have the burden of showing nondamage to other users, and so we have a whole new element here -- not just whether there is salinity or not. We're talking salinity of incredibly small amounts. The way it is important in the Grand Valley is we have salinity-sensitive crops, in particular, peaches, apricots, and grapes, so it might be that a whole economy could hinge on that issue that you can't measure.

A. (Eric Wilkinson) I tried to address your answer on interruptable contracts. Under a substitute supply agreement, it's a whole different situation. I think under a substitute supply agreement you would have salinity questions, quality questions as to the suitablity of that water for the intended purpose. In other words, you're providing a substitute water supply to replace a water supply that has historically been used by an appropriator. If that is not of a quality comparable to the original supply, there could be injury because of that substitution. That issue is the same one that Greg refers to, with salinity coming out of Wolford mountain, because in essence, Wolford, in it's operations, is a substitute water supply for Green Mountain Reservoir. It was an issue that was raised by the objectors in the Thorton case, because they were proposing a basically first use, subsequent use type arrangement within the Water Supply and Storage system. There were shareholders in the Water Supply and Storage system that had grave concerns about the quality of the substitute water supply being provided to them in that intraditch exchange. It would have become a very pivotal issue in regard to a substitute supply agreement. As far as an interruptable supply agreement, I can't see it right now as being a real hurdle.

Q. (Teresa Rice for Eric Wilkinson) You mentioned that the District was looking at a water banking idea, where they would be pooling water rights, where the idea is you would be purchasing small rights and combining them somehow. My question is, "If you did that, what would you do with the water?"

A. (Eric Wilkinson) I think my comments were more focused toward some of the entities within our district. Some of our constituents, particularly municipalities, are looking at future water supplies and the possibility of procurement of those water supplies by entities outside the basin, such as a large-scale transfer of ag rights to, say, the Denver metro area. The thing that has been considered is the purchase of those water rights for future use. Then, under an annexation requirement, instead of requiring the water to come in, ask for the cash in lieu of. Another thought that has been kicked around some is to purchase those water rights

taken through water court available on a willing buyer and seller annual basis, at least until it is needed for the municipalities. Again, going back to the pool idea, but having procured the water rights to do that rather than having a pool being an accumulation of excess water carried over from year to year.

Water Quality and Urban Supply Planning - The Upper Colorado NAWQA Study

Nancy Driver
NAWQA Chief, Upper Colorado River Basin

National Water Quality Assessment (NAWQA) Program
U.S. Geological Survey

This morning I am going to give you an overview of the National Water Quality Assessment Program, which I will be referring to as NAWQA for the remaining presentation. I will also give you an overview of the major water-quality concerns within the Upper Colorado River Basin. Just to give you a brief history of the NAWQA program, in the early '80s Senator Yates, head of the Appropriations Committee in Congress, asked our chief hydrologist, Phil Cohen, "How is the quality of the rivers and groundwaters in our nation? Are things getting better with regard to our water quality or are they getting worse? We have spent a lot of money on the Clean Water Act and Safe Drinking Water Act; are we seeing any response with regard to the money we have dumped into it?" So, Phil Cohen came to the scientists in the U.S. Geological Survey, and we said "We don't know; we have never designed a study that could answer that type of question." Senator Yates requested that the Survey put together a pilot study to be able to answer these kinds of questions. So, in 1985 we started a pilot study in five different watersheds to assess the quality of the rivers and ground water. On the basis of the pilot study, we then developed a full-fledged study starting in 1991.

The goals of the NAWQA program are first to describe the status and trends in water quality of the nation's ground waters and streams. We want to find out the present water-quality conditions. We also want to find out, over time, if things are getting better with regard to our water quality, or if they are getting worse. Second, we want to identify natural and human factors associated with observed water-quality conditions. We want to determine if it is the geology and climate, or if it is actually some land-use practices that are impacting the water quality in various areas. And lastly, on the basis of this information, we want to provide information to support the needs of resource managers and policy makers, so that they can make better water-quality decisions on the basis of the information that we collect.

One of the strengths of the NAWQA program is that it is based on a nationally consistent framework. This allows us to compare what's going on in the Colorado River Basin to what's going on in other states with regard to water quality. The way that we do this is that in all sixty study units for the NAWQA we have the same study approach; we also use the same national set of target variables. These target variables include nutrients, trace metals, major cations and anions, pesticides, volatile organic compounds, as well as radio nuclides. Our sample-collection procedures are very detailed and they have a lot of quality assurance associated with them. All of our lab analyses are performed at the National Water Quality Laboratory and this permits the methods to be the same for all of our national analyses. Also, the ancillary data that we collect are consistent nationwide. Most of these data, which are basin and storm characteristics, are stored in GIS coverages. Lastly, all the information that we collect, as well as our retrospective data, is stored in our national water information system, and this allows us to analyze the data on a national basis, as well as for the public to have access to these data.

The design of the NAWQA program is to answer questions on a national level, a regional level, a study unit or watershed level, as well as on the local level. For the national level we want to answer the questions that Senator Yates was asking. What is the health of our rivers nationwide? Is water quality improving or getting worse? On a regional level we want to look at things such as in the Midwest area, where we have a lot of agricultural land use. What are the impacts of the pesticide and fertilizer applications to the water quality on a regional basis? On the study unit basis we are looking at a watershed approach. This allows us to look at more local water-quality issues and prioritize these issues in a watershed. Lastly, the local perspective allows us to look at something specific, like the impact of agriculture on salinity in the Colorado River Basin.

So, why do we take a watershed approach in the NAWQA program? There are a number of reasons. Firstly, it helps agencies to tailor non-point source management to local conditions. For instance, with the Mancos Shale in the Grand Valley users need to manage according to that specific geology. Agencies can focus

point-source program resources on critical problems in key watersheds. In the upper Colorado River one of the point sources may be some of the mining activities that need to be managed. Thirdly, we want to address concerns of ground-water and surface-water interactions. Some of the major contaminants can be transported from ground water to surface water. We need to understand the interrelationship of these waters and the chemistry within these waters to answer and to better manage our water quality. Fourthly, we want to assess cause and effect relations within the watersheds. Not only do we want to understand the chemistry and biology, but we need to know, what is the cause of those changes to water quality. Lastly, this information can be used to prioritize opportunities between non-point and point sources. We all have limited budgets. Where do we need to be focusing those dollars? Is it on a point source issue or is it non-point where we need to be focusing our limited dollars?

This is a map of the 60 study units for the NAWQA program. In 1991, 20 study units started, and this included the South Platte River and the Rio Grande River. Then in 1994 another set of 20 study units started and this includes the Upper Colorado River. In 1997 another group of 20 units will start and will include the Upper Arkansas, Kansas River Basin, and the North Platte River Basin. These 60 study units were selected on the basis that they represented 60 to 70 percent of the public drinking water supply in the United States. They also have the major water-quality concerns within the U.S. and are located in all 50 states.

This is a map of the Upper Colorado River Basin as defined for this NAWQA. It starts in Rocky Mountain National Park and flows 232 miles to the Colorado-Utah state line. The major tributaries are the Blue River, Eagle River, Roaring Fork River, and the Gunnison, with its major tributaries being North Fork and Uncompahgre. The basin is 17,800 square miles. I will be giving a lot more detail about this basin a little later on in the talk.

This is the implementation plan for the NAWQA program. The Upper Colorado NAWQA is in the second group of study units. This is the first year, 1994, of the study and it is for planning. Then in 1995 we will be doing a retrospective analysis and looking at the historical data. On the basis of the historical information, we will be designing our sampling scheme. We will start our long-term and intensive data collection in late 1995, early 1996. We have a three-year period of high-intensity sampling. This will be for biological, chemical, and physical parameters within the rivers as well as in the ground-water system. Then in 1999 we will be finishing up our reports and starting our low-intensity data collection phase. This will continue for six years, and in 2005 we will again start a high-intensity sampling. So, it is basically on a 10-year cycle that we are doing the sampling for the NAWQA program.

One thing that allows us to compare things on a national basis between the study units is the fact that we are breaking our study units into environmental settings and using this environmental framework. The way that we break this into settings is breaking it into hydrologic areas as well as anthropogenic factors, such as different types of land uses and water uses. The hydrologic system is divided by geology, soils, climatic areas, and other natural factors.

So what are the types of policy-relevant questions that we are going to be trying to answer with our NAWQA program? Have regulations enacted under the Clean Water Act, Safe Drinking Water Act, and other acts been effective in reducing concentrations in public drinking water supplies? Is there a need for more stringent or less stringent regulations? One thing that Greg Trainor from the City of Grand Junction brought up to me was, "Well, some of the constituents that we measure for, we never get a hit on. So why do we need to keep measuring these?" Sometimes maybe in some areas we should not have as stringent regulations or measure less frequently, and then in other areas we need to have more stringent regulations. So this needs to be looked at, and the NAWQA program is going to be trying to address these issues and then report results back to Congress. Also, has the implementation of pollution abatement programs under NPDES had a marked improvement on water quality and ecosystem health of streams and rivers? Are these programs adequate in preventing contamination of streams and rivers? The Nation needs to find out if all the point-source regulations, as well as the best management practices, have helped. Are we actually seeing a cleaner environment, and where else do we need to be putting our emphasis with our limited dollars?

Other questions we need to be answering are, "Do non-regulated variables occur frequently in the nation's water supplies? If so, which variables occur more frequently?" With respect to this, we are collecting a

large sweep of variables that we are actually analyzing in the NAWQA program, and some of these are not regulated. This can help to answer whether we are addressing the correct constituents, or do we need to be focusing some of our attention on other types of constituents? Can state and federal regulations and associated monitoring be targeted to specific regions or watersheds, or to particularly sensitive hydrologic settings? One thing that the Nation needs to consider, with the limited resources available, is should we be putting more emphasis on areas of greatest concern, or areas that are extremely sensitive to certain water-quality conditions, and taking some of the resources away from those that seem to not have problems.

One of the major components of the NAWQA program is the occurrence and distribution assessment. This is our high-intensity data collection that we do to establish the status and trends with water quality. We are looking at both the stream-water system as well as the ground-water system. With respect to our surface-water system, there are three major components. The water column is basically looking at the dissolved and suspended phases of constituents. Then in our bed sediment and fish tissue analysis we are looking more at the hydrophobic type compounds. Lastly, we will be doing ecological surveys, which will include taxonomic identifications for algae, macroinvertebrates, as well as fish. In addition we will be doing habitat assessments, and with this type of approach we're able to get a multiple line of evidence in order to better explain our water quality.

I'll first be talking about the surface-water component of the occurrence and distribution assessment. With respect to our water column studies, the objectives of these are to assess the physical and chemical characteristics of the water column and relate these characteristics to hydrologic conditions, such as low flow versus high flow; sources, whether it be natural or anthropogenic-type sources; and transport -- is it being transported in dissolved or in the suspended phases. Second, for our bed sediment and tissue studies -- these are being used to assess initially what our trace element and hydrophobic compounds are, such as the organochlorines, which include DDT and DDE. This will help us then determine if we have high levels of trace elements or hydrophobic compounds. We may need to go back and do some water column studies with respect to these compounds. Lastly, for our ecological studies, these are for evaluating the relations among physical, chemical, and biological characteristics of water. One of the strengths of the NAWQA program is that we are looking at water from a holistic standpoint. We want to understand the quality of water from all perspectives -- not just the chemistry, not just the physical parameters, but also the biological -- and try to understand that interrelationship and get some cause-and-effect answers.

For our water column studies for the Upper Colorado River, we will be starting the data collection in 1996 and go through 1998. Just so that you have an idea of some of the type of work that we may be doing, I want to give you some examples of what is going on in the South Platte River NAWQA. They found in the South Platte NAWQA that the pesticide concentrations peaked during storm runoff events. A manager could thereby determine that in order to control the peaks of the pesticide concentrations, what they need to do is control the storm runoff events, and lower those peaks. Also they found that the highest concentrations and loads for nutrients occurred from Denver down to Kersey, and this again can tell them where they need to focus their management practices for nutrients. For the bed sediment and tissue occurrence survey that South Platte NAWQA did, this map shows the results. As one would expect, up in the headwater areas, which are the reference sites, they had no detections for DDT. But then as they went into the urban areas and into the agricultural areas, they had some hits of DDT; none of them were above any criteria. However, in the Greeley area there were two sites where the DDT in fish exceed the National Academy of Sciences criteria; so the team will go back to these sites and do further research in that area to determine why. It was in a mixed land use, which was a combination of both urban and agricultural land uses. They found that in just urban, and just agricultural areas they were not finding these high concentrations of DDT. So they will be doing further investigations on that. But these are the types of information that we may find in the Upper Colorado NAWQA.

For the ecological studies, again, one of the strengths is that it will allow us to develop multiple lines of evidence and give us a better picture of what the water quality is in our Upper Colorado River Basin. We won't be looking just at the chemistry or at the physical aspects of flows. We will be looking at how these aspects impact the biology and ecology of the system.

I've just finished describing the surface-water component of the occurrence and distribution assessment, and I now want to go over the groundwater component of the occurrence and distribution assessment. For

ground water there are three approaches: the first is the study unit survey, which will supplement our existing data, our historical data, and provide a broad overview of ground-water quality. In the Upper Colorado River Basin, we'll be probably sampling in the Precambrian, the entrada, Green River Formation, alluvium, as well as in the shales. The second approach is the land-use studies, which examine natural and human factors that affect the quality of shallow ground water under key types of land use such as agriculture, urban, or mining. And lastly we will be doing flow path studies to examine ground water along inferred flow paths and the interactions of ground water with surface water. A flow path study was done by the South Platte River NAWQA in the Greeley area. The area has very high levels of nitrate, and the local community was concerned about where the nitrate is coming from, and where is it going? So the South Platte NAWQA was able to do some studies that identified that the source of the nitrate appeared to be from animal waste products. It is used as fertilizer in the basin. Having defined the source of the nitrates, they wanted to know if they change this practice, with regard to their fertilization practice, how long it will take to clean up the environment. They found that it takes between five and 25 years for the present nitrate to go from the alluvial system and be fully discharged into the surface-water system. They also wanted to determine how much of this nitrate is making it to the surface water system. And they found that between 15 to 30 percent is actually denitrified within the alluvial aquifer system. This means that 70 to 85 percent of the nitrate is being discharged into the surface-water system, so basically the ground-water discharge is a non-point source of pollution to the surface water. This is the type of information that the South Platte NAWQA has been able to generate to be able to help resource managers better manage their lands. This is the type of information that we will be looking for in the Upper Colorado River Basin.

Also, another study that the South Platte NAWQA has done was when Metro came to them and said, "We're not able to meet our dissolved oxygen criteria. We have done all kinds of studies and don't seem to be able to understand what's happening." So the NAWQA team and Metro matched their funds, and developed a study to investigate why this might be happening. They looked at it from a ground-water perspective and found that the ground water was introducing anoxic water into the surface water, which was driving down the dissolved oxygen in the surface water. This helped Metro to better understand their problems, and it also helped NAWQA understand some of the surface water and ground water interactions as well as the water quality in the system.

So, these types of studies can help the limited dollars be expanded further and to address some of the local issues within the basin.

I've now given you a general overview of the NAWQA program and I'm now going to focus on some of the water-quality concerns within the Upper Colorado River Basin. The Upper Colorado River Basin is extremely diverse; in the upper part of the basin the peaks are above 14,000 feet, the mean annual precipitation is greater than 40 inches, mean annual flow is greater than 20 inches, and we have Precambrian formations of gneiss, schists, and granites. However, as we go down into the lower part of the basin, the elevation is at 4,300 feet and the mean annual precipitation is less than eight inches, and the mean annual flow is less than half an inch. The lower area has predominantly sedimentary deposits of sandstone, siltstones, and shales. So, as you can see, there's a lot of diversity between the upper part of the basin and the lower part of the basin. We need to consider this diversity when we try to break this area into our environmental settings. Water use in the basin is 99 percent surface water. This is because we have very good quality surface water as well as having a lot of canals and diversions to transport this water. Also ground water in general is fairly poor quality. The water use is 96 percent for irrigation, two percent for livestock, one percent for domestic, and the remaining percent is for mining, industrial, and commercial. Obviously, we have to consider water use when we come up with the environmental settings for the basin. The land use in the basin is predominately forest and range. This of course, attracts a lot of the recreational use in the basin, and quite a bit of the ranching is associated with that land. We also have quite a few agricultural uses, and those are predominantly along the river valleys. In addition, we have a number of urban areas in the basin, and these are growing.

There are also a number of inactive mines in the area. These have contributed significant levels of trace metals, and 27 stream reaches have been identified as being significant contributors to trace metals in this basin.

Agriculture is a very large land use in this basin. Some of the potential impacts on water quality from agriculture can be increased loads of sediment, salinity, nutrients, and pesticides. Increasing urbanization can result in increased nutrient loads, salinity, sediments, and pesticides. We can also see elevated levels of trace elements. Silvicultural activities are prevalent in the basin, and this can result in increased sediment loads to the

rivers. There are a number of diversions in the basin, both transbasin as well as transmountain diversions. These types of diversions can actually affect the water quality because the river has a lower diluting capacity below these diversions, and thereby the biology and chemistry can be affected. In addition, over 500,000 acre-feet of water is transported to the East Slope each year. This represents 12 percent of the flow that leaves the basin at the Colorado-Utah state line. This is a significant amount of flow, and also it is very high-quality water that does go to the East Slope. There are also a number of recreational activities in the basin. The ski areas use the water during low-flow times for snowmaking, and this can impact the water quality.

The major legislations for the Upper Colorado River have focused on water quantity, as exemplified in the first two compacts, and then salinity in the next four laws. What I want to emphasize here is the fact that water quality is more than salinity and quantity. We need to be looking at water quality from a more holistic standpoint and manage these basins on all of the water-quality issues, which are chemical and biological as well as physical, and not just focus on salinity and quantity. So, we need to be looking at what the Clean Water Act and some of these other acts are asking us to address. We also have the Endangered Species Act that is impacting this basin, both in the Gunnison and the Colorado Rivers. We need to be looking at the critical habitat designations as well as how water quality is impacting these species.

The liaison committee for the Upper Colorado River NAWQA, which met in March of this past year, came up with five major water-quality concerns in the Upper Colorado River Basin. These included the effects of sediment, nutrients and organics from increasing urban development on the water quality; effects of hydrologic modifications such as reservoirs and transmountain and transbasin diversions on water quality and biology; effects of metals, sediment and salinity from mining; effects of nutrients, trace elements, pesticides and sediments from non-point agriculture, and that's both the farming as well as the ranching; and effects of salinity from natural, agricultural, and municipal sources. This is what they considered to be the major concerns within this basin.

In order to address these concerns, we need to assess what the occurrences, concentrations, and loads of specific physical, chemical, and biological measures are. We also need to determine the relations between concentrations of variables in the surface and ground water to natural factors, changes in hydrologic conditions, and land-use and land-management practices. Lastly, we need to ask the question, "What are the implications of findings from the assessment activities to monitoring?" Do we need to be doing more in certain areas and less in other areas? Management -- how do we need to be managing our water resources with respect to these water-quality issues? And regulatory practices -- do we need to be changing any of our regulations with regards to this information?

Lastly I want to explain what the role of our liaison committee is. It consists of state, federal, and local water resource managers, and it is our mechanism to let them know what we're doing in the Upper Colorado River NAWQA program as well as to find out from them what they are doing. This allows an excellent exchange of information for us and for them. It also helps us to identify sources of data and information, so we don't go about reinventing the wheel. We also asked the committee to help us in discussing adjustments to program design: where we need to be putting our emphasis with our limited dollars; and to assist in the design and scope and of project products such as lay reader reports versus scientific journal articles; and lastly to review and comment on our planning documents and project reports. These liaison committees are an excellent communication mechanism in all of the NAWQA study units.

I just want to summarize that it's an absolutely beautiful basin, and I feel very fortunate to be able to be working in it.

Questions and Answers

Nancy Driver

Q: (Unknown) How do you reconcile what you're talking about, which is basically evaluating the effects of regulations of water quality now, when a lot of the regulatory framework is still in the process of implementation, is and has been in a state of flux, confusion between state and the EPA, etc?

A: Well, basically I think what this program can allow is to make decisions based on scientific findings rather than hunches. I think that so much of the confusion is because there hasn't been a good set of national data in order to make these decisions and to say, "Okay, this is what is happening in the environment and we can prove it." We can show that, in fact, we are seeing improvements here or we're not seeing improvements even though we expected it, things like that. The more data that we have to specifically address these regulations, the better off we're going to be, to hopefully cut through this confusion in the regulations, and make regulations that make sense, rather than just sound good.

Q: (Unknown) I agree with that, but aren't we a decade or two late on that? It seems we got the regulations, before we got the science for the evaluation.

A: I think you're right, but at least we're starting now.

Meeting the Needs of Our Forest Resources -- Bypass Flows

Comments by

Skip Underwood

Forest Supervisor
Arapaho & Roosevelt National Forests and Pawnee Grasslands

I'm really glad to be here this morning, particularly after the past few weeks. We have been working pretty hard to control a bunch of forest fires and brush fires in North Central Colorado. We've been struggling with our fiscal year 1995 budget trying to spread a few dollars over some pretty large program needs that we have for the next fiscal year which begins just in a couple of months for us. And last but not least, we are getting ready to make decisions on some water permits that will expire at the end of July. I expect that some of you are thinking maybe I came here today to make a big announcement about that, and I wish that I could, but I am not quite ready. The permits expire the end of July, and my commitment was to make decisions by then, and I promise you that I will. By the end of next week, I will be signing those decisions, and they'll become public knowledge. I am going to talk about some of the issues related to those decisions, and I realize that some in this audience are intimately familiar with the details of that and some others of you may not be.

I will begin by giving a little bit of a background of what that issue is about, and why the Forest Service is involved in water issues in Colorado. About 22 percent of the land area in Colorado is on national forest, and a majority of Colorado's water really rises from or flows through the national forest. One of the original purposes of forest reserves,(as they were called in 1891, now called national forest), was to maintain favorable conditions of water flow. The value of water from the forest has been recognized from the inception of the national forest. Believe me, I am very aware of that link today as well. There are a lot of water-related facilities that are on the forest -- dams, reservoirs, transmission lines, power-generating facilities -- and many of these are really old and have been on the forest for a long time, some dating back to the turn of the century. These facilities were developed with a great deal of foresight and a lot of hard work, and have been functioning well for a long time on the forest. Because these facilities occupy the forest, they are there under an authorization from the federal government. Some of the really old ones are there under rights-of-ways that were granted by the Department of Interior; more recently. a lot of these facilities are covered by what we call special use permits from the Forest Service. All of these facilities occupy public land for these good uses, and are authorized under some form. Through the years many of these facilities have been modified, some enlarged, and modifications were usually covered by changes to the permits from the Forest Service. Through the years also Congress has passed a lot of laws, and a lot of them relate to the national forest: how we manage the forest; how we deal with uses on the forest.

There are four laws of the '70s which are particularly significant to us today in how we manage these facilities that occupy the forest. Let me just run through those briefly. First is the National Environmental Policy Act, NEPA, which basically requires federal agencies to disclose the impacts of different kinds of uses, projects, and activities that occur on the forest. Second, the National Forest Management Act was passed by Congress, requiring the Forest Service to develop and write what we call National Forest Resource Management plans. These plans are intended to guide the managers, people like me, in how we manage the forest, set direction and goals, and establish standards under which the forests are managed. Third, the Endangered Species Act -- I'm sure there has already been some talk about that this week, and you well know what the act is all about. Fourth is the Federal Land Policy Management Act. FLPMA, as that one is called, has to do with how we regulate uses on the forest, specifically, authorizations for special land uses. That is our authority for regulating and allowing those kinds of uses on the forest.

Now, these permits are issued for a set period of time; they are not "forever" kinds of authorization. We call them permits and they have a definite life: in most cases that's 20 years. Some kinds of uses, ski areas for example, have a longer period of life. Most of these water issues are issued on permits for 20 years. At the end of the 20 years, or whatever that period is, those facilities come up for review and to be reauthorized. We do that under our current laws and current policy, and that's why these laws that I just went through briefly before, that we passed in the '70s, are very relevant to how we review these permits that are expiring. The

seven that I have on the table right now we are reviewing under those laws. Now, the issue for me is not whether or not these uses continue. Clearly they are uses that are welcome on the forest. We intend to continue to authorize those issues. The issue is under what conditions those facilities continue to operate, consistent with our current laws. Many of you have heard this characterized as a water rights issue, and would probably like to debate that with me today. I hope we don't get into that, but maybe we will. We clearly don't see this as a water rights issue. It is not a matter of who owns the water or who should own the water. In this case, we think it is a matter of the ability of the landowner, in this case the Forest Service on behalf of the American public, to manage the national forest for which these facilities operate. So, our purpose is to protect the land and allow the facilities to operate, allow the permittees, the facilities owners who have the state water right to exercise that right, but do it in a way that the landowner, the American public, is protected. That is really what we are all about.

As we are in this process of review, you have all heard the term bypass flow. Probably confusing to some, bypass flow is really an issue that has arisen as we have reviewed the permits for these facilities. Looking at the current laws that we have, as to how we should renew those permits or issue new permits, what are the kinds of things we should be looking at? In this case we are talking about some minimal protection of the public lands. If we're talking about water uses, the primary resource affected is the aquatic habitat. So bypass flow, that term that many of you have come to despise, is really related to aquatic habitat. That comes from our forest land management plan. The National Forest Management Act required that we develop those plans, and in the plans we developed standards under which all kinds of activities occur. Bypass flow comes from one of those standards that says we are going to ensure that the aquatic ecosystems continue to function well. Some of you have heard, with regard to the bypass flow, the 40 percent standard. What is the 40 percent standard all about? That is a way that we have quantified the relative health of the aquatic habitat. The purpose of that is to ensure that we are maintaining some minimal, what I call "a safety net," level of condition so that there is 40 percent of habitat capability --those streams are capable of sustaining trout population in the case of these streams. That standard was written as a minimal. If you look at the 40 percent, if we're going to protect 40 percent that means we're willing to give up 60 percent. It's a very minimal thing.

Now, another thing that has been discussed is how to apply that standard. The interpretation that the Forest Service makes in this region is that the standard is to be applied on every reach of the stream that has that capability. We have been asked, "Why can't you look at that on a larger scale? Why can't you look at a whole watershed and determine that you are going to meet 40 percent of the capability in a watershed?" The standard just was not written to be interpreted that broadly. If so, the results would be pretty significant to a lot of us in terms of what would be lost if you applied it on a larger scale. So the interpretation that I make now is that the standard was developed to be applied on a smaller scale, reach-by-reach basis. Now we are going to be doing some more things with that and I'll tell you about that in just a second.

The bypass flow issue relates to the local onsite issues on the forest. Another issue that Lee Carlson is going to talk about in a minute is the issue of threatening endangered species, which is an off-site effect in this case; although, when we reviewed this, we looked at whether or not the operation of these facilities was affecting, or threatening endangered species, both on-site or off-site. The effects found to be of most concern are those that are off-site. But in both cases, what drives this is the federal action of reauthorizing these facilities. It is that federal action that requires me, in this case the forest supervisor, and any other forest supervisor that these come upon, to review those permits to make sure they are consistent with current laws.

Let's talk a little about the regulatory role of the federal government, and I understand that one has been bandied around this week too. A few months ago, my daughter was reading some of the newspaper articles that have been written over this issue of bypass flow and Forest Service permits, and she said, "Daddy, what's extortion?" I had to explain that to her. You know, I gave her a good definition, and said I am not one, although some of you would argue that, I am sure. I want to make clear again that these water uses are legitimate, welcome uses on the forest. We're going to continue to authorize these uses. But in this regulatory role, as a land manager, I have a responsibility to be sure that these uses are exercised in a way that the public interest is protected and that the natural resources of a national forest are protected. That is what the law tells me to do, and that is my job. So we can debate what the federal regulatory role is, but the laws that Congress has passed place that responsibility on me.

Now I want to talk just a minute about different ways that could happen. Times change, and I have been with the Forest Service 23 years, and I am sure early on the Forest Service and other federal agencies operated with a pretty heavy hammer. We took that responsibility of regulatory authority seriously and applied it, perhaps, heavily. I think we still have that responsibility, but I also think that society is modern, and people want to be involved in making decisions about public land. People demand that; and when I am talking about people, I am talking about the public at large in Colorado or in other states who have an interest in these national forests. I am talking about local people who make their living from the forest and from the grassland. I am talking about owners of these facilities that are operating under permit. So in applying this regulatory role, I have a responsibility. I think all federal land managers have a responsibility to do that in a way that involves the people who are stakeholders. Stakeholder is another good buzz word from the '90s, I guess. I think we have come a long way in the past couple of years that we have been dealing with this issue. When I think about it, two years to deal with seven permits is a long time, and I know that many of you share that view. We have spent a lot of time and energy and a lot of money dealing with these permits. But I think we have come a long way in terms of being better at listening to each other -- understanding what the issues are, understanding other points of view, understanding other values, and understanding the values of some of the stakeholders who don't sit at the table regularly, perhaps.

We have all agreed that we don't want to spend a lot of money on litigation. We would rather spend the money on improving facilities to operate better; spend the money on protecting the natural resources. All of us have said a lot of those things. I know there has been a lot of frustration. We say those things, but we don't seem to see the result that they are happening or that we are working better together. I believe that we are. I suppose working in this environment there is nothing that comes fast; and after all, we're talking about values that are high and emotions that run high on this issue. It is not an easy process, and we have stumbled a lot along the way. I think in light of all that, perhaps because of all that, we have made progress, and I think we are doing better. I don't have to use that federal regulatory hammer. I don't feel like I have to use that if we can work together, communicate, understand what the issues are, and jointly come up with some ideas and solutions that are going to make all of us reasonably satisfied. We all recognize the values that are at stake here. We recognize the value of the water, the value of the facilities, the value of tourism in this state, the value of the agricultural economy, the quality of life that all of us enjoy, probably mostly in urban areas. I think we all recognize those things. It is a matter of how we can sit at the same table and come up with solutions.

There has been a lot of talk about collaboration. Collaboration is another very popular word, and a popular approach both in the private and federal sector. I think we are getting some pretty good examples of collaboration on the issue of the seven permits that I am dealing with on the Arapaho and Roosevelt. We have, in working with facility owners, come up with some ideas that I think have promise. Some of you are familiar with something called a "joint operations plan" that several of the water users in the Cache La Poudre River have submitted for our review. That is a part of what I am considering in decisions to be made next week. There are other examples. I think the City of Boulder has been working with the Colorado Water Conservation Board on some things they can do in the way they operate their system. The City of Loveland, another facility up for repermitting, is a Ferc license. They have agreed to do some things that include the Division of Wildlife, that protect wildlife. I think there is a lot out there that is positive. I really think that reasonable people can come to some good closure on most of these issues.

Soon after I make the decisions on these permits, the Forest Service will look on a larger scale at water issues. Specifically, we will work with the State of Colorado -- the Department of Natural Resources and the Colorado Water Conservation Board -- to look at watersheds in the national forest to try and get a picture of what the health of those ecosystems is, particular the aquatic ecosystem. We will take a look at the kinds of facilities that are operating and try to take a bigger, grander view of problems that need to be dealt with and of opportunities to do that. We have spent two years working on seven permits. I don't have the time, or the money, or quite frankly the energy to do that on seven more permits. I have a hundred more permits just on my forest alone. There are almost a thousand in the State of Colorado. So, it is time to look at some different approaches that might work better.

We all agree, I'm sure, that water is a very precious commodity in this state. It has been a precious commodity in the past, it is now, and I am sure it will continue to be even more so in the future. No question, water has been instrumental in the development of the West and particularly Colorado, making this a thriving

place and a great place to live and work. There are also precious biological and aesthetic values to water: the tourism economy and just what people want and expect to maintain the quality of the natural resources in this state that a lot of us and a lot people from outside the state have come to love and respect. I think that all of us have the responsibility to both present and future generations to make sure we're making wise choices in how we use those resources and how we manage them.

Questions and Answers

Q: (Unknown) You have the 40 percent requirement for bypass flows, and in the current draft you are looking at over 60 percent. I have to worry that pretty soon you're going to 110 percent at some point. You described the scientific process that you used to come up with the percentage of the bypass flows. It seems that you are just using one flow instead of all three, and oftentimes some of the public process you are using for involving the public in the future.

A: Let me talk about the forest plan. The 1984 plan is the current plan we are managing under. We are in the process of revising that plan, and expect to have a draft of the new plan out in the summer of 1995. We are looking at a number of pieces. One of the things that we are looking at is particularly the 40 percent standard that you mentioned. Perhaps that standard would go up. That suggestion has been made by some, that perhaps that standard is too low as a minimum safety net. We've made no decisions on that. I think the reason some people think it is too low is that if you apply it on a reach-by-reach basis, that means we are going to maintain 40 percent of the habitat capability; we're willing to give up 60 percent. Some think that is unacceptable. That's too much to give up on a national forest that is supposed to be featuring management of natural resources. I also mentioned the work we will do with the state looking at watersheds on a larger-scale basis. I am not sure how that might interact with standards that we develop in our forest plan that will come out in draft fashion. What I can tell you is, to the extent of my knowledge, when that standard was developed it was drawn from a standard that was developed around terrestrial species, In some cases not just big game but terrestrial wildlife species, and was modified some to apply to aquatic habitat, fisheries specifically. We think that the science at the time served that okay; we are looking for other ways to use that standard. I can't give you a good answer on how in the new plan we might do that differently. I guess all I can say right now is it is a standard we are reviewing but I am not sure of how we will come out on something that may be different.

Q: (Unknown) Can you give me an example of what larger picture you're going to be looking at? It almost sounded as if the permit system, case-by-case permitting, was a cumbersome process. Maybe the bigger-picture analysis will somehow change that.

A: I still have to be able to make decisions on individual permits, and they come up ten or twelve a year, although that rate will probably increase. If we look on a watershed basis, I think we are going to be looking at, for example, the Big Thompson River, or Boulder Creek, looking at what the conditions are on a watershed basis, what kind of facilities are located there, what kind of opportunities we have in the operation of those facilities, what kind of problems need to be fixed and how do we do that in the context of reauthorizing these permits. I am not sure how we work through that yet, but I think we all agree that it is a more sensible approach. It is a variation on the Platte River study for endangered species, looking at the bigger picture.

Allocating Water for Endangered Species and Other Non-Humans

Comments by

Lee Carlson

Colorado Field Supervisor
U.S. Fish & Wildlife Service

I appreciate the opportunity to come to this conference and give a talk. I have a hunch most of you know me by now. I think my name was mentioned up here more than anyone else's. Actually, I take that as a compliment. My job is more than just administering the Endangered Species Act. My job is working with people to resolve problems, and I guarantee we have problems. I want to talk about one of those, Section 7 and the requirements under Section 7. It is still confusing to many people. I want to talk about the seven Forest Service permits that Skip just talked about as well, and the process we went through and how we have now resolved those problems.

Essentially, Section 7,A2 is the issue we are talking about. That is a section of the act that requires consultation. In essence, it says that any federal agency whose actions may adversely affect any threatened or endangered species must consult with the Fish and Wildlife Service about those impacts. The process essentially has four steps.

The first is a species list. Real simple; somebody asks us for a species list and we send it out.

The second phase is informal consultation, which can last anywhere from a phone call to years.

The third phase is a biological assessment, or an equivalent document from the lead agency about the project, and about the impacts they see to endangered species. The conclusion of that is a statement by that agency whether or not there is an adverse effect on the species.

The fourth phase, and the one that I spend the most time at, is the biological opinion. That's a document the Fish and Wildlife Service puts out, an official statement by the Service about the effects of a project on threatened or endangered species. In a biological opinion, we determine whether there is jeopardy to a species or not. If there is jeopardy, we determine if we can come up with reasonable and prudent alternatives to that jeopardy, to essentially preclude jeopardy. I have to tell you that we have been 100 percent successful in finding resolution in Colorado. I wouldn't guarantee that for the future. I know of a few projects I don't believe can be built and comply with the Endangered Species Act. But to date, we have been 100 percent successful. We also can come up with conservation recommendations that are more advisory in nature. These are things that we try to get people to agree to, but which aren't absolutely required. The last phase of a biological opinion is an incidental take statement. Through Section 7, we can issue take permits for species incidental to a project's actions. We can also condition that take pretty severely. It is very much like the jeopardy standard. If there is going to be a take, we will condition the permits as to what to do with that take, trying to avoid the take if possible, or mitigate it.

Next, I want to talk about the projects that Skip alluded to. The Forest Service came to us in December 1992 and asked about endangered species on the seven projects in the forest. We said there were possible problems here; everything from on-site issues to off-site, clear in Nebraska. So the Forest Service sent us a biological assessment. They were under an extreme time frame to come up with that assessment and they did a very credible job, but it wasn't enough. The projects in question were Barnes Meadow and Peterson Reservoirs, both owned by Greeley; Joe Wright Reservoir, owned by Fort Collins; Long Draw, owned by Water Supply and Storage; The Idlewild project, which is a hydroelectric project owned by Loveland; Boulderhydro, owned by Public Service; and Lakewood Pipeline owned by the City of Boulder.

When we got that biological assessment in January of 1993, we recognized that there was a lot of information that we still needed. The biggest issue turned out to be, exactly what are these projects? I had

heard of all these projects and I had even fished in some of the lakes, but I really didn't understand the projects. I had no idea from the outset how difficult it would be to do seven projects at one time. We literally had meetings of 40 to 50 people, each group having their own concern over their own project. Skip, myself, and our staff were trying to deal with those at one time. That's an extremely difficult thing to do, but we did it. The major issues turned out to be what are these projects, what is connected to them, and what is not.

I'll give you one example. There were many issues like the one I mean to discuss. Longdraw reservoir has as part of it the Grand Ditch, which is 20,000 acre-feet of water from the Colorado River Basin. The ditch flows through Rocky Mountain National Park and dumps water into Long Draw. In the Endangered Species Act there are two terms: interrelated actions and interdependent actions. What actions are associated with a federal action, actually a part of it or dependent upon that federal action? So the question at Grand Ditch was, "Is it connected, is it interrelated or interdependent to the Forest Service action which is permitting the lake?" Water Supply and Storage was able to demonstrate that it was not. If Long Draw Reservoir went away, they still would have other ways to bring that water across the mountain and use it. Why is that important? Because if Grand Ditch had been interrelated or interdependent, the consultation would have included West Slope issues. It would have included the four endangered fish found down here in the Colorado River. That's why that issue is important. What species are we talking about? The species at issue in Colorado are two, the greenback trout and the Ute Lace Tress, a small orchid found along the Front Range. It has an interesting distribution. It's found along the Front Range in Colorado, and then jumps all the way over to western Colorado and Utah, and nothing in between. We have no idea why. Those two issues we were able to turn into nonissues ultimately, although we did struggle over greenback trout. Because of the bypass flow issue, had we had greenbacks that we knew about in the system, there could have been an issue for greenbacks. It turned out it was not. We were either smart or very lucky in the greenback restoration program several years ago, in putting greenbacks and restoring greenbacks into areas we thought would not have problems with 404 permits or Forest Service actions. That's the case here. None of these projects, we feel, have an adverse effect on these species.

The next four are the big problem: the palet sturgeon, the least tern, the piping plover, and the whooping crane. All of those we determined jeopardy on. Those are species in Nebraska, some 300-400 miles below these projects. We are talking projects at 10,000 feet elevation, and impact from depletions all the way into Nebraska. Just so that you are aware, we decided any depletion in the Platte River Basin, regardless of size, is a jeopardy. The reason for that is no other decision is defendable. If we try to cap at anything say, over a 100 acre-feet, how do you defend that argument? The answer is, you can't. We've done the same thing on the Colorado River. Any depletion equals jeopardy to those four fish. That's your only defensible argument. The other species are the Cure Lue, Eagle, Bering Beattle, Orchid, and at one point we had the Peregrine, but we decided it was not an issue. There are no jeopardy calls, and the Peregrine we decided are not in effect at all. They are nonissues. The issues are the sturgeon, the plover, the tern, and the crane.

We struggled on these projects from January to October of 1993, at which time we produced a draft biological opinion that I think pretty well offended everybody. But we had to do that. There were clearly problems for the proponents, problems for the Forest Service, and problems for us. It wasn't what we really wanted. It was workable from our viewpoint only, but it wasn't what we wanted. So we struggled from October until June of this year coming up with a better idea. You heard from Ed Osann yesterday talking about part of that better idea, and that's a recovery program for the Platte.

The problem of working case-by-case on projects versus some more holistic viewpoint has been mentioned. Absolutely correct; this case-by-case is beating us all up and not doing a bit of good. It's sure not doing these species any good. What we really want in the Platte River is a recovery program similar to the one we have in the Colorado and San Juan. We want something that will achieve recovery of the species. Not that we can just beat people over the head with a club, which is what section 7 gives us the authority to do. We struggled a long time on what to do with this. We still had jeopardy. We had to find reasonable, prudent alternatives, and ultimately we did do that. We came up with an alternative that would be implemented in two phases. The first phase was interim measures. I want to emphasize strongly that these are only interim measures. In no way is this a permanent solution to these issues. It's only a bridge between the time frame when Skip signs the permits until we have a program in place. My point is that any attempt to use this as a 20-year permit solution will fail. The program will have to deal with this, and I'll talk about that in a minute. There are three parts to this format. The first was to figure out the applicant's share of the problem. We had an estimate from Grand Island Gage

that there was something like 3 million acre-feet of water that was depleted over time -- no idea where it is from, just measured at Grand Island Gage. I also know that number is probably incorrect today, but it is still in the books. We know what the project's depletion is at the source and the total of these projects, all seven combined, was around 14,000 acre-feet. (By the way, Lakewood Pipeline has been tabled. We'll be doing that in the next couple of months, but the other six have been completed.) The only point of this is to get a percentage. What's the percent of a project's problem or their share of the problem? Totally, for 14,000 acre-feet, that works out to less than .5 percent, so we're talking about small projects here.

We then use that in two ways. Trying to come up with a cost for water, we felt that we had to have a solution for both a water issue and a land management issue. Back in the spring we came up with target flows for the endangered species out there, mostly the birds. I won't explain how we got into target flows, but the difference between the target flows and flows that are out there today on an annual basis is right at 400,000 acre feet. So, to meet the target flows, you need about 400,000 acre feet of more water. You take that times the applicant share. We are trying to find a way to sense a chargeout, moneywise, to the program much as we do on the Colorado River.

The second part was looking at habitat needs. There is a biology report from the Platte River Joint Study that said in the Central Platte we needed about 29,000 acres of habitat restored for those critters. Approximately 9,000 has already been done, leaving 20,000 that is still undone. Again, times the applicant share, we came up with a cost for acquisition and maintenance in Nebraska. We then divided that one by 20 years to annualize it, so we had an annual cost of about $14,000 per year until we get a program going. Again, I emphasize this is an interim solution only.

What do we really want? I don't want your money. Bennett Raley up in Fort Collins said I want your water; in a sense he's right. I don't want to steal it; I want us to work together to find a way to do this. What we want is a recovery implementation program. Service can't do it alone, states can't do it alone, and Forest Service can't do it alone. We have to work together on this, just like we're doing on the Colorado River. On the Colorado River we have a program. It's a bumpy road, but at least we are going down a road. On the Platte River right now we don't even have a road to go down, so we're going to create one. Ed Osann talked about the MOA that was signed in June this year by the Governors of Colorado, Nebraska, Wyoming, and Secretary Babbitt for the US Government. Basically, it says we are going to work together as a team and try to find solutions to these problems. A recovery program must deal with several things. It must deal with recovering the Platte River ecosystem and the corridor, so it is no longer an impediment to endangered species. It must serve as a primary basis for future Section 7 consultations, just like the Colorado River Program does. It must address instream flows, wetlands, riverine habitats within the Platte Basin. And, of course, this is the one that has everyone in a furor -- we must find a way to resolve this. I don't want to steal anyone's water, but we must have water for those critters down there. I think this will be the biggest issue to struggle over. I don't know how it will be resolved, but we must find a way to do that.

I have to tell you, we are all at risk doing this. We have interim measures, we have got a program that doesn't even exist; in fact, at the end of May we weren't sure at least one of the states would even sign this MOA, let alone a full-fledged program. So we're at risk. We're out on a limb, and I hope nobody saws it off. We are at risk and that's all of us -- not just the Service, or the Forest Service, or the permitees -- we're all at risk. A number of times the last few days we talked about cooperative efforts. That's the name of the game if we're going to succeed in this. We have to cooperate. We have to better understand each other. I have to understand your issues and you have to understand mine. We just have to get on with it. I think this program is an excellent cooperative effort if we can get it moving, and I believe we can get it moving because I know the alternative is looking at 1000 permits individually. Or at least for Skip, a hundred permits, and it took us 17 months to do seven.

One last point I'll make. What happens if we don't get a program in three years as we're asking for? We built into the consultation an automatic reopener clause -- that we will reinvestigate the Section 7 issues should a program not come to be, and literally start all over again. I hope we don't have to do that. We've had 17 months of energy go into this, and I hope it wasn't wasted.

Q. (Unknown) We had several speakers yesterday that spoke about agricultural efficiency on the Platte River, basically stating that they did not believe there was a greater opportunity for efficient use of agricultural water in the watershed, and stating that the status quo has established a system where downstream holders of junior water rights would be impacted should they decide to use their water more efficiently. I look at that view as a somewhat antiquated attempt to preserve the status quo. I found it hard to believe that greater efficiency of water would be impossible. It seemed there were ways to work around this issue, perhaps incorporating more people. Just the preservation of the status quo didn't strike me as enough of an argument to not look at greater efficiency of agricultural water use. Could you comment to that?

A. I'll comment this way. I don't claim to understand the South Platte system as well as I need to. It will take me some time to fully figure this out. Barb made a comment yesterday that I wrote down, about the fact that the groundwater mounding that's occurring because of irrigation is adding water to the Julesburg Gage. And certainly in the late summer, or fall, it's absolutely happening. There's no doubt in my mind about it. What I don't know is what's happening with the spring peak flows in the South Platte, and I don't understand that at all. To paraphrase a statement, "If we leave it alone it will come." Maybe that's true at least for the South Platte, but keep in mind the issues in Nebraska include the South Platte, the North Platte, and the Main Platte. It is not a one-state solution that will resolve this; it is all three working together. What is the share Colorado, Nebraska, or Wyoming owes? I have no idea how to deal with that yet. We will struggle over that. I hope the three states will do the struggling, so it doesn't look like the Feds are just going to pound it down somebody's throat.

Q. (Unknown) What's your plan on the Platte River Endangered Species Program for factoring in the credits for the West Slope water that is in the Platte at the Nebraska state line?

A. That's a very good question. I don't know the answer to that one either. I'll give you another problem, if you will. That's the Colorado-Big Thompson Project, which moves over 200,000 acre-feet from the Colorado River to the Platte. Please don't take this in any negative sense, but what if we were to move some of that water back to the Colorado River. I am not suggesting we are going to do anything of that nature, but what if we did? It would have a negative impact on the Platte river endangered species. That one will be fun. We will do a new Section 7 on that one in two to three years. There's a whole bunch of issues related to that, but as I recall there's about 400,000 acre-feet of Colorado River water that comes over the mountain into the South Platte basin. It certainly adds water to the system, there's no question about that. I am sure some of that water is measured at the Julesburg Gage. I don't know how to factor it in, but it must be done.

Human Water Supply and Environmental Requirements

Comments by

Chuck Lile

Director
Colorado Water Conservation Board

Last night when I was at the barbecue I was listening to the cowboy poetry and I made an analogy between my job and some of the poems. I recently purchased a book that says, "Don't squat when you have your spurs on." Sometimes I feel like that is what has happened here.

As you all know, we in Colorado sit at the headwaters of four major rivers: the South Platte, the Arkansas, the Rio Grande and the Colorado River system. The people of the State of Colorado are in a crossfire between environmental regulation, human needs, and demands from downstream states. To manage the need for water for human uses in a growing state while recognizing the necessity to prevent the loss of quality life and protect our water resources is an ongoing and complex process which we at the CWCB are involved in and challenged by on a daily basis. This conference, I think, is very apropo at this time, because this debate is what we are talking about at this conference -- the management of human water supply needs within the complex regulatory scenarios that we have. This issue is being focused on throughout the United States. As a member of the Western States Water Council, all of the policy issues that you are hearing discussed today are brought before that Council, and policy decisions are formulated so that we can make recommendations to the Governor's Association and to the Congress on methods to manage and balance these issues.

The federal agencies presently have an unprecedented impact upon how we manage our water, and as a result of the laws that have been passed (including the Clean Water Act, the Endangered Species Act and the Safe Drinking Water Act), we are having to deal with these issues in a very complex management system. The debate on the impacts from the federal laws that is currently being focused upon in Washington, D.C. is not only being centered around the environmental concerns but also the mandates to states in terms of cost, the takings of private property rights, and the lack of scientific data to support such stringent regulation in proportion to the risk that is associated with these laws. All is not as bleak, though, as perhaps you have heard, and I believe we have, in Colorado, some success stories and ways to manage and still do responsible resource development, while addressing water quality and endangered species issues.

As a result of the Clean Water Act and the need to meet water quality standards to the Republic of Mexico, the Colorado River Salinity Control Forum was established in the 1970s. It is basically a watershed management process where the seven basin states in the Colorado meet regularly, working in cooperation with federal agencies, (including the Bureau of Reclamation, Bureau of Land Management, and Soil Conservation Service), as well as the local communities, to reduce the salt loading in the Colorado River system so that we can maintain a clean water supply and meet obligations in terms of quality, particularly to the States and to the Republic of Mexico. It has been going on for 20 years. It is not a new program; it is out there and it is a way to solve problems.

Additionally, you have heard a lot of discussion today about the Upper Colorado Recovery Program, the San Juan River Recovery Program for endangered species, and the Memorandum of Understanding that is being developed on the South Platte. So there are ways to pull everyone together and try to resolve these issues without extensive litigation. There are opportunities out there, but it is often very hard to work through them. The complexity and technicalities that we have to deal with are often mind-boggling.

The programs that were particularly designed for the endangered species are designed for management purposes of recovery of the species while allowing for the continued development of the water resources of our state. Again, these were difficult programs to develop. They are based on a watershed management-type approach, with all of us all working together -- the water users, the state, and federal agencies -- toward a common goal. It is somewhat ironic, I have noticed, particularly in trying to obtain funding for these programs, that there is an annual tin cup brigade trying to get money from Congress in Washington for the Upper Colorado

River Basin Recovery Program. We also have to work very hard to obtain funding for our Salinity Control Program. In part, it comes down to some basic principles: it sounds popular and seems the thing to do, so we pass laws to address these environmental and endangered species concerns, but it still takes dollars and cents to implement them. In addition, there is competition in our government for funding to support these programs because of the other needs of our citizens. On the one hand we have programs in place, but then we still have the battle of working together to raise the proper funding to accomplish the goals.

I have been talking about some success stories and we have heard from Skip and others this morning about the Forest Service. This story, I hope, will be a success story. I would like to spend a little time discussing where Colorado is on it as a result of some legislation. First, I would like to say that it seems we have been arguing and debating the issues associated with uses on the forest for at least 30 years in the West. The Forest Service has filed for reserved water rights claims in most of our divisions; they have filed in other states; and they have been litigated in other Western states. In New Mexico and Colorado we have debated issues and litigated issues and spent a lot of taxpayer dollars fighting over and trying to define or get our arms around what those rights that belong to the forest actually are.

Believe it or not, people in the West are quite neighborly. I have a personal piece of property that had a ditch on it when I purchased the property, and the neighbor shared using that ditch. I knew there had been some conflict with the previous owner of my property, and that there had been some sort of problem. One Saturday morning the neighbors came through with their tractor and were a little huffy. They went right through my yard and started cleaning the ditch. We could have handled that situation in a couple of ways. We could have gone out, threatened to kick them off the property and made a problem. But I chose to handle it by picking up my shovel and going with them to help clean the ditch where they couldn't work the tractor. From that day forward we got along very well, and when I needed water from that ditch there wasn't any conflict. The point I am trying to make is that people in the West will work with you, but they really don't like command and control and demands being placed on them. We are having to work in that parameter, and we all need to think about how we approach problem solving.

We have heard about the joint operations plan and we have been supportive of it. I hear positive things coming out about it and I hope it will work to solve those problems. We have had good working relationships with the Forest Service. Ellie Townsley and Skip Underwood have been very diplomatic and professional and tried to do their job to look for solutions. We have also expressed our desire to look for solutions. However, it is clear to the Water Conservation Board that we must assist and aid the water users to prevent their loss in yield or substantial increase in cost to them as a result of the permit requirements.

The Colorado General Assembly has appropriated $100,000 for us to conduct joint studies with the Forest Service, and we have extended an invitation to the Forest Service and are currently in discussions with them about how we could spend $100,000, each of us contributing to work for solutions and for the collection of scientific data to support those solutions. At the same time, they gave us $4 million for a litigation fund to protect the yield of the communities. Simply put, we have a carrot and we have a stick, although the stick is much bigger than the carrot. I have to emphasize that it is clear to us (the Board and our staff) what the intent of the Legislature is. When you go up to the Legislature, we have a rule called the 1833 rule -- it takes 18 votes in the Senate, 33 votes in the House, and you have to have one person on the main floor to sign the bill. When this legislation was passed, there were very few dissenting votes, so it is clear to us where we have to stand on these issues. I hope we can look for solutions; however, we will stand by the water users to try and protect their yield.

Ellie Townsley, in her speech to the Water Congress meeting a few weeks ago, being very diplomatic, asked why we couldn't change our law to allow for recovery of the bypass flows as they go by and give the people credit for it? I must say, as an administrator of water rights, that law was developed over 75 to 80 years of litigation as well as legislation. How we operate and manage reservoirs in this state is very crucial to everyone. We need to sit down and study and understand how that administrative system works so we can all understand why people get so concerned about this. It seems to me that it would be a much easier approach rather than change state law to develop a flexible management plan that allows us to look at site-specific and basinwide approaches where necessary, where we can utilize existing state law to look for solutions.

Finally, I would like to talk briefly about some of the lessons we learned this week as we were in the Gunnison Valley. We held our board meeting here for two days; we took a tour; we looked at a valley that is operated between two very large reservoirs; we listened to the environmental community and the water user community; and my hat is off to the people in the Gunnison Valley. I think they have some things figured out here, and we all have to stop and pay attention to it. The basic theme, I believe, is we have to interact rather than react. We have to think about what we are doing. It is not simply quit diverting water. If you quit diverting water and quit placing it on the land there is a timing impact, a reuse impact, a wetlands impact -- you just cannot take a straight, simple approach. You have to go look at the site, think about it, and be very careful how you handle it.

With that, I would like to sum up and say we should try to understand each other's problems, but not at all costs. We still have to look out to protect the existing uses that we have in Colorado.

Human Water Supply and Environmental Requirements

Comments by

Rod Kuharich

Utilities Department
City of Colorado Springs

Before I get started I would like to tell you in advance that I am committed to a balance, providing resources for humanity as well as protection of the environment. You may think that some of the things I will say today may not indicate that, but they need to be said because there are many things happening. I oftentimes think we find ourselves cloistered among like interests and we don't get to see the bigger picture. I always enjoy an opportunity like this because it allows me to attempt to look at the bigger picture, rather than stay focused on issues that are of concern to Colorado Springs and the protection of our resources.

First, I would like to address the municipal fiduciary responsibility. Municipalities are committed to providing a potable water supply, adequate wastewater treatment, and in the Colorado Springs case electric and gas supplies, to the population that will allow for business, commerce and life in general to continue. Health, safety and welfare, in terms of water, are pretty lofty mandates that are placed on the supplier of water resources. The standard of living which is oftentimes taken for granted, and the enjoyments we have in life, are built upon a foundation of health, safety and welfare. It is a mandate that comes through the federal government, through the state government to the municipal government. However, with the municipal government we are face to face with the people. They come in your office, they go to your city council persons, they get immediate response.

About ten years ago, I was asked to arbitrate a water rate dispute that involved a rancher who supplied water to a small subdivision located adjacent to his land. The rancher said, "Well, if I don't get what I want in terms of the rate for this water, they can just go somewhere else and get their water." One of the things I did when that issue was raised was to go to a lawyer and ask, "What of this situation? Can he just shut them off?" It turns out that state law and a long history of court decisions prohibit that, and it applies to all domestic water suppliers. You cannot disconnect people. That is the foundation the entire system is built on.

Colorado is a growing state, whether you like it or not. E. O. Wilson probably wouldn't be real excited about it. He thinks that the sustainable population for the country is 50 million people. I asked myself the question, "How is he going to get there?" I do think it is incumbent upon us to plan to provide these basic services to the growing population. In that regard, the planning process I have seen in our municipal water supply system and in others in the state and elsewhere is what is described today by the buzzword, "integrated resource planning." I will be the first to admit that demand site management has not been a major focus of this planning process. It is more and more. It is not because the mandate is there. You heard Ed Osann talk about this conservation plan requirement for recipients of Bureau of Reclamation water. What you didn't hear him talk about was the money that was going to come from the federal government so these communities can pay for this planning process. We have the mandate, but not the money.

The Integrated Resource Planning Process is nothing new. It has been around for years. It is based on sound planning principles. The emphasis needs to switch in some cases. Switching to a demand site management emphasis is a direct response to the inability of communities to develop water supplies for future growth. They need to stretch their water supplies. You will not find water conservation or demand site management the panacea that will answer all of the questions. It simply is not there. You can't divide your existing water supply enough to supply for long-term future growth. That means new water supplies must be built.

Economics is an important consideration also. Since we have this one-to-one contact with our citizens, affordability is something that is critical to them, and believe you me, as someone working for a municipality I have to respond to that, which means I have to maximize the resource and in a balanced sense minimize the cost. In terms of the cost of doing business in this day and age, regulatory impacts seem to take the fore. I

have identified in my outline three areas that I wish to address, although there are very many more: the Clean Water Act, the Safe Drinking Water Act, and the Threatened and Endangered Species Act. (There are a variety of others: National Environmental Policy Act, Public Health Act, and for Colorado Springs there is the Public Utility Hold Company Act.)

With the Clean Water Act (whether authorized by law or not) we have seen an ecosystem or watershed approach evolve. What is this approach? EPA's documentation on this is to say let's take a reference stream and look at the water quality requirements of that reference stream and apply those requirements to any stream in question, such as the one you are discharging to. The problem you have is that there is not enough state and local flexibility to address local geologic, hydrologic or climate conditions. In many cases in the West the discharge is the stream. I will touch on that a little later. Water quality standards are also important. Since the Clean Water Act was passed in the 1960s, this country has seen a real boom in the interest in water quality. We are at a high quality level now we haven't seen for decades. These improvements evolved out of focusing on point-source discharges. The focus now seems to be more on non-point source urban runoff and agricultural runoff. I think this is what we are going to wind up doing -- we will have spent 10 percent of the money cleaning up 90 percent of the problem, and now we are going to spend 90 percent of the money cleaning up the remaining 10 percent of the problem. There is a diminishing return here at some point.

With water quality standards, several things have happened recently that give me concern. One is San Francisco Bay. California had a water quality plan and EPA just disapproved it. EPA said, "Dilution is now the solution to pollution. We need about a half a million acre-feet of clean, fresh water into the delta to dilute the pollutants." That has yet to blossom into the courts. It surely will. You cannot take a half a million acre-feet of water that has been used for domestic purposes, industrial and commercial purposes in a large metropolitan area and expect that population to sit idly by while their costs increase, while their supply diminishes, and their future economic viability is at stake.

Second, the City of Tacoma went for a 401 water quality certification to the state. EPA got involved in it and said the state didn't handle this very well, and as a result Tacoma needs to release water. That one did go to the Supreme Court. The decision was, guess what: "Dilution is the solution to pollution." We are building a record as we go here.

The State of Arizona had their water quality standards denied by EPA, which further said that NPDES discharge permits need a Section 7 consultation to determine if any endangered species are impacted. Well, that is the water discharge side. We already have this consultation requirement on the water supply side. I think in many cases science is sorely lacking. In other cases the agencies charged with responsibility of protection are the very agencies that put us in that place to begin with. I use the Colorado River as an example. EPA is now using the "enforcement first" approach. It doesn't matter whether or not you have endangered any one; you pay the fine. We are ignoring the status quo benefits. In many cases in the West the ephemeral streams that rely on discharge result in creation of wetlands, bird populations and aquatic populations that exist simply because there is that discharge. Screwing down on the water quality standards will force communities to go to zero discharge and there go the status quo benefits.

The Safe Drinking Water Act -- there are going to be 25 contaminants every three years imposed on municipalities to test for. Whether or not they are there doesn't matter to the EPA. Colorado Springs recently entered into a consent decree because we did not provide filtration to one segment of our community. Although we documented there was not a health risk and we were moving to filtration, we still paid a fine. Additionally they required off-site improvements -- improvements to various other habitats that had no connection with the filtration issue.

The Threatened and Endangered Species Act -- I don't believe there is enough science behind the species listing. It is being driven by increasing office staff and budget. The more species USF&W has listed, the greater the regional office budgets become. In many cases, such as the Red Belly Dace, Arkansas Darter,and my favorite, the Flannel Mouth Sucker, these fish produce like bunny rabbits. The reason is there is so little water (in the arid west) they need a large population out there so that a few can survive to maintain the species.

Habitat protection and Section 7 consultation on the Colorado River -- we will see existing projects go back though a Section 7 consultation because habitat has been identified on the Colorado River and needs to be considered. The question was asked of Fish and Wildlife, "What about these projects that predated the Threatened and Endangered Species Act?" They are going to deal with those on a case-by-case basis. Those of you who are in that situation, look to get picked off one by one.

Future trends -- the regulatory trends are clearly command and control. I don't have time to individually address the ones that I would like. In some cases the legislative function is being usurped by the regulatory function. Future legislative trends: The Clean Water Act is dead this year. The Safe Drinking water act is in ICU (Intensive Care Unit) right now. The Threatened and Endangered Species Act is dead this year. WHY? Because property rights, federal mandates and risk analysis, what the environmental community terms "The Unholy Trinity," is taking the fore. People are looking at global competitiveness, they are looking at their own well-being, and you can only push it so far before the pendulum starts to swing back. You may see this backlash occurring at a legislative level within the next three to four years.

HUMAN WATER SUPPLY AND ENVIRONMENTAL REQUIREMENTS

Comments by

Nancy Jacques

Colorado Rivers Alliance
Durango, Colorado

First, I am standing here representing a group that most of you have probably never even heard of, the Colorado Rivers Alliance. It is an infant, really, formed last March. I co-founded this group as a service to help communities protect rivers by constructing a web, an information network if you will, that connects pre-existing organizations, groups, businesses, agencies, and individuals together who care about rivers. That way, we know what each other is doing. I also travel the state visiting local watershed communities: working to break down stereotypes; listening to what people with differing specific interests value about their rivers; and encouraging active participation in caring about them.

When I give talks around the state I am frequently asked, "What issues are you or will you be working on?" And I reply, "That depends on your concerns." Still, the common denominator will be the health of watersheds, which supports everything else discussed in the last three days.

My voice is on behalf of the rivers, and the riverine systems. This leads me to a paradox. I stand for a voice for rivers, having been deeply involved in them for a decade; yet my professional training as an educator and system psychotherapist means that human relationship gets a lot of my attention, which is perfect. As mentioned at this conference, it is our human relationships, our values, our perceptions, our communication styles and our vocabularies that affect everything else -- plus one aspect of our humanness not necessarily emphasized previously at this conference, our fears. To represent rivers, then, my expertise must really be with people. So, after much research and reflection, I am going to ask you certain questions as I share my own philosophic background and base.

As individuals, our perceptions are not born in a vacuum. We know this. We are products of the environment. Still, we are thinking beings; so, ideally when we reach a certain maturation level, individuation occurs. If we are in tune with our own health, individuation requires that we reevaluate the system of values we have been taught. We take stock of ourselves, not allowing larger systems to do our thinking for us. It happens quite naturally, as circumstances and new information are taken in by us through the course of our living. If we attempt to avoid this process, life can bring consequences that usually encourage us to reconsider. Larger systems do the same process over time. In healthy environments we get natural succession.

Social systems work the same way, and just like each of us, when a larger system becomes rigid in the attempt to avoid the process, life brings consequences that encourage us to reconsider. Institutions fail, governments topple. History is full of fine examples of this process. History is full of times when we did not listen.

Our overall perception of water use has ancient, ancient roots, but site-specific to the West, its application is no older than 130 years and historically is not even rooted in water but in mining, as we can document. Yet how many of us hold onto the perceptions that certain inalienable rights exist over the natural resource of water that is a system far older than any of our belief constructs?

How are these perceptions of so-called inalienable rights coloring decisions that affect our social and natural systems? Historically, we have tried to subjugate and control nature as we well know, using other priorities of growth, development, and economics to protect our self interests and to measure our time, energy, and quality of life. These values have shaped our culture and our land. These perceptions were absolutely applicable to the time in which they were invented out of perceived necessity. But all life and relationships change. They cannot remain the same. No relationship does. Look at your own life. We have created laws to protect those historical attitudes: to define beneficial use totally anthropocentrically; to protect our historical turf through "first in time, first in right," which now reflects a narcissism because we are not the same as we once were.

We are maturing. If our social systems are to remain healthy and vital, they must be flexible enough to reflect the growth of life within them. They must accept new information.

There are sweeping changes in perception happening based on ecological principles planted by the seeds of our visionaries: from Thoreau, Leopold, Robert Odom (with his landmark 1964 publication on ecology) to countless writers and social and environmental scientists today. This wave of knowledge and energy cannot and will not be contained no matter what social construct attempts to thwart it. There are surveys happening in this state right now. These are random samples of people's perspectives on the environment. Overwhelmingly, from varying cultural, social, and economic foundations comes a collective voice terribly concerned over development, planning, and population growth, with the bottom line message: conserve the environment!

Years ago Aldo Leopold called it a land ethic. On March 4, 1948, he wrote, "We abuse land because we regard it as a commodity belonging to us." The word "land" to Leopold stood for the whole dynamic system. Leopold may be very overquoted, but really, are our state institutions yet listening to the wisdom of this forester? He also said that land as a community is the basic concept of ecology...and that land is to be loved and respected as an extension of ethics. Ethics require personal accountability and responsibility to that which we are a part. So, if we no longer believe that the earth is the center of the universe, then why is it that our sociopolitical systems and our values seem to continue to reflect that life revolves around our species, despite sweeping popular sentiment and infinite information to the contrary?

The whole affects the part that affects the whole. So I ask you to assess yourselves and listen to vocabulary used that reflects how we attempt to integrate new information into old value systems and where it isn't working.

First, the title of today's forum is "Constraints." Under that title are topics like "Allocating Water for Endangered Species" and "Balancing Human Needs with Ecosystem Integrity." "Constraints?"

How about "minimum instream flow?" What might happen to our perception of the importance of living vital systems if we called them "riverine flows," implying that we recognize that water floating down a river is connected to a whole lot of other life?

" Bypass flows," what a term. You can't tell by that word what it means, even if you know water. When I first heard the term, I guessed it stood for the water that bypasses the river and flows into the diversion! Wasn't I surprised.

Next, what percentage, in one type of assessment, are we using to measure the vitality of a riverine system? Isn't it the 40-60 split? I am afraid this was not quite accurately presented a couple of days ago, so I will try myself. For the sake of the lifestyles of people, 60 percent of what we decide are measurable characteristics of a riverine system can be omitted. That means 40 percent is left...based on our own linear models of multi-dimensional systems.

I don't dispute the careful research and planning that goes into assessing these percentages. Rather, I ask us to look at the percentages themselves. Biologists know the irony of this process.

Another term I heard only implied in the last two days through the Endangered Species Act (and I certainly didn't hear that act spoken of with much reverence even though it would indicate our maturation and understanding that the Act symbolizes something extremely critical) is called "indicator species." We are defining the warning system of nature by that term. In psychotherapy, in family systems, the "indicator species" is called the "identified client." They are the part of a life system that mirrors the ill health of the whole system. For example, do you believe an acting-out child does so in isolation with no relationship to its family of origin? Can you actually believe an endangered amphibian, bird or fish is just an animal on its way out?

Thirty years ago we poisoned some fish in Colorado. As a matter of fact, we poisoned a whole lot of them because we thought it was best. Now we are spending a lot of money trying to correct our own shortsightedness. I am sure you can think of a plethora of other examples, socially and environmentally, where we have goofed, from nuclear power plants to discrimination. Maybe you can recognize a few circumstances in

your own life where you wish you had done things differently. The point now is that we cannot use naivete as an excuse any longer. We may not know the details, but we know the dynamics, the patterns and the potential consequences. The question is, have we matured enough personally and collectively to take the responsibility for the fact that we are no longer ignorant of life processes?

This panel is called "Human Water Supply." Isn't that interesting? What happened to the perspective called water supply, or water supply and human needs, not wants or rights, or water supply and life needs? How much do we really need?

There are many fine examples of urban areas across the Front Range beginning or continuing to implement water efficiency programs. That is wonderful. There is collaboration, cooperation, but where is the real power? What is happening legislatively? How many lobbyists are there protecting vested water interests? How many lobbyists speak for riverine health as their values base? Yes, collaboration and cooperation are occurring, but all the good work is confined within a system operating on values based prior to environmental knowledge and based on protective territory for what? Not cooperation or collaboration with the system that supports it all, the environment.

The rest of the title of the panel is "environmental requirements." The inference is, do we need them? Let me ask you this. How many laws do we have in Colorado today that describe and measure values of a free flowing river system? Or allocate water for optimum health as beneficial use? How many support (not begrudgingly) endangered species? When I hear things like the Forest Service (which, incidentally, is you and me) is "stealing our water," or the goal being maximum use of natural resources, there's no doubt in my mind that environmental requirements are needed. I sympathize with detail absurdities and "bureaucratic regs," but in general I find it ironic to hear the tongue-lashing and fed-bashing that has occurred when, in fact, so much of the West benefits by subsidy -- an almost gratis use of federal lands that are also used to benefit private property values. Further, as Mr. Osann alluded to yesterday, the federal bureaucracy has begun to implement that elusive term, "paradigm shift." Has Colorado? I know that the Bureau of Rec has secured the counsel of the heads of nonprofit environmental organizations because they know, and they have shown, that they know what they are talking about.

Tell me what special interest, what turf is it, that so-called "enviros" are trying to protect, anyway? (Do you think I am making a lawyer's wages for the work I do?) Who is it that ultimately benefits from an environmentalist's labor?

In the maturation process we move from egocentricity to accountability to a larger system, not because of punitive threats, but because we recognize that our own autonomy does not mean independence. It means interdependence, not just with people, with all of life. So please evaluate for yourselves what the answers might be to the following:

Are state laws on water congruent with current information that retains healthy and vital environmental systems? Do current actions of state water agencies and legislators actually represent and support the concerns and values of the citizenry at large? What if we stopped punitive measures directed at folks who wished to protect the health of riverine systems by creating ways to allow water right users to dedicate water to the resource itself? What if there was a way for folks like me to actually be represented by a water structure?

I know in my area the Southwest Water Conservation District voted $5,000 toward reforming the Endangered Species Act. No special interest there, right? I had no say in the matter. Taboo things that I say, I have been warned, but I am in good company. Charles Wilkinson wrote in his book, Crossing the Next Meridian, "Nevertheless, whatever may have been the original rationale for these old laws, I have been able to find few principal reasons that justify their continuation in the late 20th century West." Daniel Worster, in Rivers of Empire, wrote: "A new spirit of restlessness and challenge may be gathering, and it may acquire sufficient momentum to force radical changes in western water empire." Further, he states: "Those strategies must begin with a new relation to nature and new techniques, from nature domination to nature accommodation." And finally, we need a measurement for every decision that we make personally and collectively. And I refer back to Aldo Leopold:

The key log which must be moved to release evolutionary process for an ethic is simply this: quit thinking about decent land use as solely an economic problem. Examine each question in terms of what is ethical and aesthetically right, as well as what is economically expedient. A thing is right when it tends to preserve the integrity, stability, and beauty of a biotic community. It is wrong when it tends otherwise.

Human Water Supply and Environmental Requirements

Comments by

Frank Stephens

Director of Water & Sewer
City of Greeley

In 1947 the City of Greeley bought Peterson Lake and Barnes Meadow Reservoir mainly to augment its direct flow rights in the Poudre River in the fall and winter. In 1994 we are even more dependent than in 1947 on these releases, particularly the winter releases from Barnes, to keep our water treatment plant operating.

Here is a little background on these two facilities. Barnes was built in 1922 on a combination of private land and a Department of Interior easement. Its original capacity was 1700 acre-feet, and it was enlarged by another 650 acre-feet in the late '60s. The enlargement backed up a little bit of the reservoir on federal land; that is, if the reservoir was totally full, about ten acres of Roosevelt National Forest gets wet.

As a matter of operation, Barnes only stores in late May and June. It is fairly junior, and is usually in priority to store for less than three weeks. Some years, like 1994, it might be in priority for only a few days. Barnes releases are in the winter. It is only one of two high-mountain reservoirs in the Poudre that can be safely operated in the winter. Often the releases from Barnes are what keep the river from freezing solid. Barnes releases typically are counted as keeping the channel cut through the ice.

The other one is Peterson Lake Reservoir. Peterson, when full, would hold 1,250 acre-feet, but the dam needs repairs and the State Engineer has it under restriction at present. Peterson also stores in late May and June. It releases in the fall, and its gates are wide open all winter long so that all inflow in the winter passes straight through and out. Peterson was built on a Department of Interior easement back in 1922. Both it and the Barnes Meadow enlargement have had Forest Service special use permits these last 20 years.

Both these facilities are fairly popular camping and fishing attractions in the Roosevelt Forest, and the two permits combined, if they were able to store to maximum capacity in a wet year, would be about 1900 acre-feet. These special use permits, as you have heard, came up for renewal in 1991. As a condition of permit renewal, the Forest Service wanted bypass flows. The language proposed by the Forest Service as a permit condition I would like to read to you:

> The permittee shall release an instantaneous flow of ____ cfs from the reservoir outlet at all times except when the inflow to the reservoir is less than _____ cfs, in which case the release shall equal the inflow.

This is really important -- this is what the whole thing is about. The blanks were later filled in at 2 cfs and 3 cfs for the two reservoirs for the spring and summer months.

The Forest Service wants bypass flows because they are concerned about aquatic habitat immediately below the structures, even though Barnes and Peterson are way up at 9,000 and 9,500 feet respectively. They are on intermittent tributaries with fairly steep gradients. For example, the Peterson tributary goes off the side of a mountain and is characterized by two and three-foot waterfalls. It prohibits what biologists refer to as bidirectional migration for fish. There is not enough pool to launch from to get up those waterfalls. I can vouch for it being steep, because the last time I hiked it I had to get first aid afterwards for scrapes and gouges.

The Forest Service has cited its authority as the Federal Land Policy and Management Act (FLPMA) which says that terms and conditions in federal land use authorizations should minimize damage to habitat. Forest Service also relies on the National Forest Management Act (same year, 1976) that says permits should be consistent with local forest plans. Of course, it relies upon its 1984 Forest Plan which states as a goal that 40 percent of habitat potential should be retained in all areas of the forest including stream channels. However, both FLPMA and the Forest Plan for Arapahoe-Roosevelt Forest also state that permits are subject to valid existing rights.

The City objected to the bypass flow condition because it diminished the yield of the City's long-established water rights and also because it appeared to me and others in the City that it was environmentally counterproductive. One result of bypassing storeable flow is that all water bypassed would count against the City storage right, so that the reservoir would never fill. Additionally, these two reservoirs only store in late May and June during the peak of the hydrograph when most of the water is coming off the mountains, and they release in the low-flow months of the following winter. Bypassed water in May and June, on top of Greeley's direct flow rights in the Poudre, could not be beneficially used by Greeley. Moreover, the water which is bypassed in May and June has not been held high to be released later in the winter during the low flow period. Fisheries biologists report that the fish in the Poudre need more winter flow. Forest Service ecologists have agreed that the critical limiting factor to fishery in the Poudre is low winter flow. So, the more you bypass in June from Greeley's two small reservoirs, the less you have to release in January.

Skip and others in the region, and I assume headquarters as well, have stated that bypass flow condition in the permit does not interfere with either the exercise or yield of water rights. The mayors of Greeley, Boulder and Loveland, Colorado's Attorney General, the State Engineer, the State Legislature, Representative Allard, then Representative and now Senator Campbell, and Senator Brown disagree. Again, because these facilities in the Poudre are relatively junior, these reservoirs are only in priority to store for one day to three weeks in late May and June. The other 344 to 364 days a year, state law requires that all inflow to the reservoir be bypassed -- passed straight through. To bypass flow when you are in priority to store denies the owner the opportunity to exercise those water rights and to use the water.

Let me give you a little analogy here. Say you are a Western State College student and the only reason for you to own a car here on this gorgeous campus might be to drive into town to work in the evening. If I, as a federal regulator, take away your car keys for ten hours a day, I am not taking your car, but I am certainly affecting your ability to go to work, and possibly even influencing your ability to pay tuition. Now, in 1992 the Secretary of Agriculture responded that bypass flow requirements would not be imposed on existing water supply facilities.

> The permits will obligate the permittee to accommodate the resource goals of the forest to the extent feasible without diminishing the water yield or substantially increasing the cost of yield from an existing facility.

Then, as you have heard, the Forest Service embarked upon a National Environmental Policy Act process, and although these were permit renewals for existing facilities with no change in baseline, and although the 1984 Forest Plan had its own NEPA environmental impact statement which postdated these reservoirs, Forest Service invited Fish and Wildlife Service for a Section 7 consultation on these small facilities. That is when we got to know not only Skip very well, but also Lee.

Section 7 of the Endangered Species Act requires all federal agencies to consult with the Secretary of the Interior on all major federal actions to ensure that the action does not jeopardize continued existence of endangered species, a very worthwhile goal. The Fish and Wildlife Service's difficult job is to determine if endangered species may, in fact, be affected by the federal action. Now, this is my perspective on the ESA Section 7 process. Basically, the Fish and Wildlife Service has three choices:

> the action will not affect the species;
> it will affect them; or
> it may affect species.

What is a cautious and responsible scientist going to say if he is asked to state his position on, for example, whether or not there is intelligent life on another planet? "Yes, there is, I spoke to them last night." Or, how about, "No, the cosmos is silent out there." Most responsible scientists, especially those on the government payroll, will say "Maybe." Therefore, the Fish and Wildlife concluded that these reservoirs, one up at 9,000-10,000 feet in the Poudre headwaters, <u>may</u> affect species in Nebraska and in the Missouri River, and that we needed to pay mitigation. So, in order to move forward on this, we agreed to pay the mitigation as long as we could reserve the right to perhaps later argue some of the data and the conclusions in their biological opinion if the whole thing blows up.

Having completed Section 7, Skip now has essentially two choices: either to authorize the continued occupancy of the national forest with a bypass flow condition or allow us to operate the reservoir in a way that we believe, and also the Colorado Division of Wildlife believes, has even more of an environmental benefit than bypass flows. It is my understanding that less than one-tenth of one percent of the aquatic habitat in the Poudre watershed gets a benefit from bypass flows. There is somewhere between a 10 to 20 percent gain in habitat units in the main stem of the Poudre from a proposal that was put together with Greeley, Water Supply & Storage Company, and Fort Collins. It is a joint operations plan in keeping with both the Department of Ag and the Forest Plan policy, as restated by the forest chief, to accomplish the goals of the Forest Plan without decreasing the yield from existing facilities and without significantly increasing the cost of that yield. And, the joint operations plan recognizes that low winter flows are the limiting factor to the Poudre fishery. The three Poudre entities that I mentioned will cooperate and sequence the operation of these reservoirs up in the Poudre to release a steady, ten cfs for 150 days throughout the winter. That is 3,000 acre-feet. If we were going to try and build a reservoir today to make winter releases to fishery for those five months could well cost over $15 million. There are conditions, one of which is that the snowmelt has to be there in the spring to store for it to be released in the winter. I don't think that is a hard condition, I think it is a natural condition, and the same thing applies to bypass -- if there is no flow coming in, you cannot bypass it. The fish can use this 3,000 acre-feet; they can swim in it, perform all essential bodily functions in it, and we still get to drink it when it gets down below the forest. Plus, we have stated our willingness to include the joint operations plan as a condition of the authorization to continue to occupy the forest.

Things did take a slightly horrible turn, however, during the NEPA process when the Forest Service headquarters distributed new standard permit clauses which allowed the forest supervisor, now or future, some fairly broad unilateral authority to amend or revoke the permits at any time for reasons such as "in the public interest," or management decisions, or changes in the Forest Plan. All sense of security for water supply is somewhat banished by these new permit clauses, even if the joint operations proposal is included as a permit condition. The only type of land use authorization that makes sense for an existing water supply reservoir and one which has no record of harming the environment is an easement, with a term that has the same length as the economic or useful life of the reservoir.

Many issues surround these tribulations that I have outlined above. I would like briefly to address four of them.

Forest Service Authority on Bypass Flows -- We believe, and I will not state it as a fact but as a belief, the Arapaho Roosevelt National Forest is getting outside of its legal authority to impose bypass flows on existing facilities. We are fairly comfortable in this belief if the disagreement has to go to trial. But a trial of state and local government versus federal government seems like a colossal waste of public resources. Moreover, we are concerned that the Forest Service -- Skip mentioned the Organic Act, or at least the purposes of the Organic Act -- we seem to be changing toward a preservation use of the forest and away from its original conservation uses.

The Irreplaceability of Supply -- If part of long-existing storage is lost to federal permit conditions, what is the likelihood of building replacement supply? The options for replacement appear to either be the construction or new dams or the conversion of productive farmland to dry range. I see clearly, at the very least, greenbelts around the cities might suffer.

Takings -- The definition of property, as I understand it, is controlled by state law, and Colorado law does recognize that water right is a property right. There is a lot of a community's investment-backed expectations in a long-term water supply, and those are at risk right now. It appears to us that 100 percent of the bypass flow would be lost to beneficial use since it could neither be stored nor beneficially used in those months of May and June. I am not an attorney, I am an environmental engineer, but it is my understanding that one of the hallmarks of a reasonable regulation that avoids a regulatory taking is the need to mitigate harm with regulation. I don't think there is any evidence of environmental damage in the Roosevelt National Forest that might support the assertion that bypass flows were a reasonable regulation of federal land use. Therefore, it appears to me and some others that bypass flows might be a compensable taking.

Federal Government Land -- The federal government owns some 662 million acres, and it is heavily concentrated in the western United States. The federal government owns 34 percent of Colorado, and as Skip

said, 22 percent is national forest. Most of it is high ground where our snowmelt runoff comes from. If you think about the hydrograph with the high peak in June and some real low valleys in December and January, think about the fact that in the Poudre, for example, the monthly average flow in June is 40 times what the monthly average flow is in January. These forest permits and the preservation policies that accompany the bypass flow request have a lot to do with economic growth and development, and I think a lot of it could well bring up very fundamental issues of growth or no-growth for Colorado.

Let me summarize on two points -- water supply and protecting the environment. Federal law and the Forest Plan both say that land use authorizations are subject to valid existing rights. A community's right to capture and store water at a specified place during peak runoff and then release it during the low-flow months I think can be characterized as a property right in Colorado. Water supply for the settlement of the West is part of the reason that the national forests were reserved. I do not believe nor do I think it is logical to deny citizens their ability to store water in June when those storage rights are in priority and then say that the citizens' water is not being taken away.

Second, bypass flows from Greeley as sought by the Forest Service appear to only to add more flow in May and June when it is abundant, and when water is coming off from all slopes of every tributary. The only benefit, as near as we can figure, will be to a tiny fraction of the aquatic habitat in the Poudre Basin. It has a negligible effect on the 50-mile canyon run below these facilities which is, by the way, Wild and Scenic. Bypass in June flow hurts fish habitat in the winter, it seems to me. The more we bypass in June the more the fish might be stressed by low winter flow. We think there is a better way with the joint operations plan.

This process of renewing permits for existing facilities has many spectators and participants, yourselves among them, in a position to appeal or litigate any decision Skip makes. We hope that the interested participants recognize a constructive and cooperative solution in our proposed joint operations plan.

Comments, Questions, and Answers

Lee Carlson, Skip Underwood, Chuck Lile
Rod Kuharich, Nancy Jacques, Frank Stephens

(Unknown) Let me make a general comment about the dialogue that has gone on. I don't want to apologize in advance for what I am going to say here, but it strikes me that open, lively discussion about all of these issues is healthy. We have to do that to communicate honestly. I know I have gotten a lot of honest communication from Frank and from others in the past couple of years. We need to do that. It is important to do that. But at some point very soon, in private and in public, we have to get beyond feeling like we are posturing, taking positions as if we are ready to go to court, and get down to the nitty-gritty -- commit to each other and to the public that we all serve -- that we are going to work through the issues and come up with solutions. I do believe, as you have heard some of the speakers say, that we have made progress and are still making progress. What we all need to demonstrate is a commitment to do that in a public way. We are going to come to the table and come up with solutions that serve all of the publics well.

(Frank Stephens) I want to point out to everyone that your two municipal representatives suffer severe hair loss.

(Lee Carlson) I guess I would make a comment about what Mr. Kuharich said. I coined a phrase a few years ago called "listing for dollars." He made a comment that the more we list the more money we get. I can't speak for the rest of the nation, but I can guarantee it is not happening here in Colorado. I have plenty on my plate to do. I don't need more. What we <u>are</u> doing is trying to find ways <u>not</u> to list species. We are working with Chuck, the Division of Wildlife and many others trying not to have to list species. The boreal toad is the latest one we have dealt with. I have been petitioned to list it and we are trying to find ways not to list it. We are working very hard with the Division on that issue. You mentioned the Arkansas darter -- that is one I don't think we have to list. We know how to recover the Arkansas darter; we have done it. We don't have to list everything in the world. You also mentioned the lack of data, and that is a severe problem. We <u>must</u> use the best commercial and scientific data available. Sometimes that data is totally inadequate. We need better science, absolutely.

(Rod Kuharich) The real point that I was trying to get at was that in many cases these laws are used as delaying tactics; used to increase the cost of projects; used to stop the projects. I think we have seen that in many areas. I guess one of the real concerns I have is the backlash that is building. There are two sides here, pro and con, and we are just a small segment of the population. The average Joe Blow doesn't watch the evening news or read the newspaper, but you affect his television time and he becomes irate. It is affecting that average person in one way or another that is going to cause the response. My concern is that the backlash, if it builds fast enough and swings the pendulum too far to the other side, will cause more environmental damage than has happened in the past. Clearly, as a society we possess more ability to change the environment now than we did 50 years ago.

(Chuck Lile) We at the CWCB, along with the Colorado Division of Wildlife, have been working on developing a program with a goal -- from the perspectives of the water user, the Division of Wildlife and the Fish and Wildlife Service -- to prevent the listing of species. In other words, wake up to some of the problems we have caused in the past and try to manage in such a way that we do not drive the species to that situation. We are willing, our Board is participatory in it and I know they are willing to looking for solutions and so is the Division of Wildlife, and I think we will be seeing some activity along toward the fall with CWCB and the Division of Wildlife trying to put together a funding package that may help us look for ways to aid those species that are getting near becoming listed and try to sustain and increase the population. We can all learn as we go along, and I think that is happening.

(Moderator) Up here we have five public officials and an educator and citizen who is among that group that prods these public officials as they create policy and regulations. Nancy spoke of paradigm shifts.

It seems to be a new federal word. I spent yesterday as a guest of BLM invited to serve on a large, diverse committee of ranchers, wildlife interests, environmentalists and educators trying to devise an educational system for the general public about grazing. Now I know this isn't water, but it is related to water, and the BLM had convened this. They had set ground rules, and we had to help them come up with an educational strategy to enable them to create or impose a paradigm shift. The first thing we did was say it is not a paradigm shift if it comes from above. I think what Nancy is pointing out is that as we are starting to deal with these changes, it is the local, state and federal systems that see what is coming and are trying to adapt to the situation. It is a few people on the ground who are starting to drive that, but the rest of us are in the middle staking out our territory and trying to figure out where this is going. Historically in our country this has happened on several occasions, and we ran through those with the BLM yesterday. But unless it is grassroots and unless we can work together and articulate a voice, all of this regulation isn't going to matter. That is the message I heard from her talk and it certainly sounded with me having struggled eight hours yesterday trying to convince the BLM that yes, we could help them with an educational program but it wasn't necessarily going to be the way they wanted it or the one they wanted. How do you all feel about releasing some of these decision making processes to consensus building among diverse interests?

(Skip Underwood). It is awfully hard to give up this notion of "turf." So many of us have operated that way for a long time and we have our own authorities, we have what we think is right for the world or whatever piece of it we live in, and it has been a tough change to make. But clearly, it is what we need to do. It is what our publics expect us to do. When you talk about sharing decision making, what do you think about a federal agency that has the hammer, that has those laws, and says this is how we can regulate. It is never a comfortable feeling. Maybe it will become a more comfortable feeling to share that, to work in an open, decision making environment. We are clearly moving in that direction. I talked about forest plans that we are revising. We have designed that to be very interactive with the public. There are some that are very uncomfortable with being so interactive as to allow the public to perhaps assist in making that decision. It is not a vote yet; I don't think I want it to get to a vote. But the idea of getting all the affected interests together and trying to come up with solutions is a challenge. I think we have to begin managing that way, and the public deserves it.

(Lee Carlson) I mentioned the recovery programs we have on the Colorado and the San Juan and we hope to have on the Platte. Operate on consensus -- that doesn't mean the Service gives up its authority. It does not. But it does mean we are using groups like that to try to build a process whereby everyone is involved. That group, at least the one in Colorado, works on consensus. But in terms of things like Section 7, the hammer still remains with the Service. In a sense we have given up some of our traditional role of "We won't tell you how to do this" to a more untraditional role of "Let's all figure out how to do this." I think that is the best way to go, but there are some authorities that can't be given up unless Congress chooses to do differently. Certainly, laws can be changed.

(Frank Stephens) I believe one of the things the federal agencies need more of is the opportunity for facilitated resolutions, mediation, alternative dispute resolution in general. I think it is probably a little more efficient use of everyone's resources to get into that, but again what it takes is, as Skip said, backing off the turf, but a little bit of relinquishment of authority also by both. But I think Lee is right. The rules, as they are set up, would take some pretty fundamental changes in federal procedures and laws to allow that. I think that if you can get into some facilitated resolutions and have it work through multiple interested parties, we will all be far ahead.

(Lee Carlson) A point out of law that is a disincentive to what we are talking about -- consensus building -- is FACA, the Federal Advisory Committee Act. Skip and I can talk to each other any day of the week about any subject, but when we go outside the federal family we have to be careful about how we deal with it. If there is a group that is an advisor to the federal government, it could fall under that act and become a problem. The lawsuits are just now coming about on this particular law. It has been around since 1972, but the lawsuits are just now coming. It is becoming the federal sunshine law.

(Moderator) That is certainly something we have run into with some of the things we have been working on in Gunnison. It is a brick wall at the moment. A traditional western community like

Gunnison would rather do it to ourselves than have outsiders do it to us. Someone, though, at some point has to resolve the differences that creates in resource allocation to those communities and to the environment as a whole.

(Unknown) If this conference had been called, "Quenching the Urban Criminal," some people would be arguing that we need demand side management and we need to teach them how to shoot straight so they don't need as many bullets, but people would then point out that eventually they will need new guns, and there would be a lot of discussion about how there needs to be more cooperation among gangs so there is not as much conflict over turf. I think there has been entirely too much emphasis on quenching and not enough on giantism.

(Unknown) I have one comment for Lee. I have a hard a time considering what you are doing is consensus, if you continue to point out that there is a hammer, and a big one, of a Section 7 consultation any more than we have a paradigm shift if BLM is handing something down. But a question to Skip and to Lee: The bypass flows that you propose are not proposed for adjudication under state law. How, specifically in the South Platte which we heard yesterday is an overappropriated, used and reused river system, do you expect to get that water shepherded across the state and across another state to benefit the pallet sturgeon?

(Skip Underwood) The bypass flow term that we are using, that issue is local. It is right on site in the vicinity of the facility -- the dam, reservoir, pipeline or whatever. The bypass flow need is to keep some minimal amount of water flowing in the stream. There is not an expectation that that relatively small quantity of water would make it to the endangered species habitat downstream. So, bypass flow is the local view of this issue. I will let Lee talk about the tougher challenge of how he gets depletion flows to Nebraska.

(Lee Carlson) Earlier I said I didn't know, so I will say that again. Clearly, those are some major, major issues in the Platte Basin as they are in many other places. We have decrees and compacts between Colorado and Nebraska and between Wyoming and Nebraska. Wyoming and Nebraska <u>are</u> in court over their issue. So far, Colorado actually puts more water down the river than its compact requires it to. Is Colorado willing, able, interested and can it dedicate some of that water above and beyond the compact to the system for endangered species? I know Chuck is looking into that kind of thing. I don't know the answer to that question. I know we need water for those critters. I don't know where it will come from. The only thing I know is that a program is the only way I know to try and deal with the issue. Otherwise we go to court and see who wins, but I don't believe that is the right way.

I want to throw out another question that was handed to me during break. It reads, "Could you comment on the effects of unregulated groundwater pumping in Nebraska on critical habitat?"

This is a major issue. If Colorado could deliver water to the system for the crane, would Nebraska simply steal it through unregulated groundwater use? The answer today probably is yes. So, where is the incentive to deliver water? Right now the answer is, there is none, at least during the times of year when those groundwater pumps are functioning. We think we can move some water during the nonpumping season, and we are looking at that, but we can't move every drop of water during that time and no drops the other times. This may be one of the main reasons Nebraska had a hard time signing an MOA. Clearly, this will be a major, major issue for them to deal with and for the upper two states to push, if you will.

(Skip Underwood) The question is, "You said that this is not a water rights issue. The Madigan letter directs permits be reissued in a manner that did not affect the yield of existing water rights. If this is not a water rights issue, do you intend to follow the directives in Secretary Madigan's letter? "

For those of you who may not be totally familiar, you have heard Madigan's letter mentioned. Former Secretary of Agriculture Madigan issued a letter in October 1992 that said the Forest Service should reissue these permits for existing facilities without requiring bypass flows, that we should not adversely

affect the yield of existing facilities or cost a lot of money. However, it did provide for the facility owners, the permittees, meeting the resource goals of the forest to the extent that it was feasible without costing a lot of money or taking their yield. So the question is, do I intend to follow in that direction. Someone wants to know what my decision is next week, I expect. I can respond to the question. I read the Madigan policy as one that directs me to do those things. It relies primarily on voluntary measures, its intent is that permittees offer to do things to meet forest goals as long as it doesn't cost them too much money or affect yields. I am receptive to that.

(TAPE ENDS AND NEW TAPE BEGINS)

(Unknown) ...to my constituents, and I think this goes to what will be discussed later on today also. Secondly, I do think that if you begin upsetting people's lifestyles, you will get a backlash. The last President was elected with a minority vote -- didn't even get a majority of the voters. What kind of apathy do we have in this electoral system that allows for something like this to happen? I am first generation American, and I don't look at voting as a liberty or as something that just comes along with living in this country. I look at it as a responsibility, because my ancestors never had that opportunity. Look at the vast majority of people in this country that don't take that responsibility. Clearly you and I do -- otherwise, we wouldn't be here discussing these issues. But the majority of people in this country don't. They are more concerned about making their monthly house payments, sending their kids to school, a wide variety of things, and the specifics that we deal with here, as long as they don't affect their lifestyles or impact their economic standing, are going to continue. But the minute they do, you are going to find a backlash developing.

(Nancy Jacques) I want to add a little bit to that, because I think it is true but there is also something else, apathy and frustration, because a lot of people don't think that their vote is worthwhile. I think that grassroots empowerment is important and that consensus building through citizen input in policy is extremely important. I think that when that happens, you get people at the polls.

(Unknown) Lee, you indicated that we are data-short, and in the Colorado River Basin I think that's a fair if not an understatement, isn't it?

(Lee Carlson) Yes.

(Unknown) You have also indicated that the riprap program is on a rocky road. Do you see any impediment to your dedication to that river riprap program no matter how rocky the road gets, so we in fact will get to the end goal?

(Lee Carlson) One of the reasons a riprap was created was to force ourselves, all of us combined, to make sure this thing happens and to make sure it works. The program has been around for about eight years, and until we had the riprap we didn't have good, solid dates to work with other than those 15-year windows out there. From a Section 7 point of view, which drove a lot of the riprap requirements, if the riprap doesn't get done, if for some reason dates slip (and I'm not sure how far they have to slip before we get really serious about this) the Service has a concept that will look at the riprap each year. It will look at the program and ask if it continues to be a reasonable and prudent alternative for Section 7. If we don't get these jobs done, if we don't get the fish recovered at some point, the rip will no longer be a reasonable and prudent alternative. That's the hammer that Chris was concerned about. Last January we looked at it one more time and said we had sufficient progress still going. Next January we will evaluate it again and make another decision. But we must progress.

Q: (Unknown) Who has the input to that decision, particularly in light of the fact that we are data-short and we are trying to develop data as quickly as we can in both your organization and those working with you? How can we assure, or try to reach assurance, that on an annual basis you renew that commitment and we can work with it even though the road may be rocky and we have a lot of differences?

A: (Lee Carlson) Certainly from within the Service, myself, my staff -- we all have input into the decision. So does the management committee that is formed for the recovery program and the coordinating committee that oversees the whole thing. Everyone has input in it. But again, that hammer is Ralph's decision.

(Unknown) We are involved in this Colorado River Recovery Program also, and some of the sentiment is we enter into good faith and you enter into the process as long as you want to. That is the hammer, because at any time you can say, "You're the Indians; we're the Feds, and we are not going to play anymore. This treaty doesn't mean anything." So, in many cases, existing and future resources are at stake for the communities that are involved. But there is no firm commitment or binding arbitration. I realize that you probably can't enter into that. It really causes the other side to wonder when the hammer will come down.

A: (Lee Carlson) I don't agree that we are not entering in good faith. I absolutely disagree. We are in these programs in good faith. We don't have to have the program. I could write a Section 7 on Frank's project and tell him what to do and there it is. We haven't chosen to do that. We have chosen a different route. We are very committed to this program, but that hammer exists because there is a federal law. The federal law is the hammer. We cannot, unless they change the law to make it happen, usurp that authority.

(Unknown) We seem to be at a stalemate. We have a private environment. We have water rights that are held privately, in my view, in the State of Colorado, and we have federal folks who are trying to enforce a public mandate. They are trying to act on behalf of the public and we are all the public, which we should remember. It seems to me that maybe we could meet in the middle somehow. Maybe the State of Colorado could acknowledge public values for water. Maybe the federal government could acknowledge private rights, and maybe possibly kick money in for compensation, which is an accepted practice for land use. I don't see much of a difference with water. But I do think the public values associated with water rights need to be acknowledged by the State of Colorado as well. Then maybe we could meet in the middle and get past some of these stalemates.

A: (Chuck Lile) First, I would like to say that as early as 1973 Colorado started a program to look for ways to resolve issues. In particular, we established the instream flow program, so I don't think it is quite fair to say that we haven't recognized some of these issues. Again, even you as a citizen, the water rights that you drink, the water that you use, you share in that water right system. You have to keep that in mind. There is not an easy answer to any of these problems. We continually look for ways to reach consensus on issues that impact us all. I certainly, though, support you in asking the federal government to kick in some money. That is the crux of the issue sometimes. I would like to take a moment to support Lee or to let the audience know that. I was talking about the big problem we are having, and that is obtaining funds. That is one of the rocks in the road of this recovery program, obtaining the appropriations necessary to move forward. The state, water users, Fish and Wildlife Service, the environmentalists go to Washington on an annual basis and work very hard on that. We have to deal with those things, and again there are examples of how things are being solved -- The Upper Colorado Recovery Program is one of those examples.

(Nancy Jacques) I will just reiterate that all of you have a vote, you have access to policy makers. Information will help us remove the polarization and resolve some of these issues. The time to get hard facts and information from the scientists, obviously, is not when there is a problem. It is to start now and have a database that will help you address problems as they emerge.

Q: (Unknown) I think the biggest environmental value in Colorado is recreation on the public lands. As we all know, it is the economic engine driving most of our rural communities now. It is the big value for many of the newcomers from out of state who are making their homes here. The federal managers on this panel have addressed their mandate to protect habitat under the law. How do we include the recreational values, the perception that it is and always will be a place of unparalleled natural beauty? That is what people want, what they want to sustain. Part of it takes the form of freeflowing rivers with

abundant water in them. I would like to know how the agencies view their mandate to sustain those recreational values.

A: (Skip Underwood) I think I have probably covered some of those points. That is certainly some of what is at the heart of the water issue for the forest when I was talking about the values of tourism. Recreation is probably a big part of that. It is bigger than just water issues. It relates to how we cut timber, where we cut timber, how we manage for other kinds of uses of the national forest. I am very clear on what the mandate is for the Forest Service in managing public lands for a variety of uses including water, timber, recreation and wildlife -- all those things. It is a basketful of values. It is a balancing game and has been one since 1891 when the forest reserves were first set aside. We are a little different from the Park Service or the Fish and Wildlife Service. We do have a mandate to provide for a variety of uses of which recreation is one. Certainly in Colorado it is a very important one. Probably in many people's minds economically it outweighs some of the other uses. I see the mandate as one of seeking that balance and understanding clearly where the values lie.

A: (Frank Stephens) My family goes up into the Roosevelt Forest, the Poudre Canyon, pretty often. Often we will go in the fall and winter as well as the summer. In my view, the Poudre is somewhat more attractive in the fall and winter because of Peterson and Burns Meadow releases.

A: (Chuck Lile) Let me get to an issue that I am hearing here. There are always opportunities to learn and listen, and I am hearing a lot that our rivers are drying up and that we are not meeting these needs. That to me is a real myth. What's happening is that Colorado sits at the top of the divide and we have to deliver water downstream to every state below us. We are required to keep water in those streams to take it down. There is a certain percentage of water that has to flow out of our state to meet our obligations to other states. To get the perception that we are drying up all of our rivers -- because of our interstate compacts is not physically something that we are doing. We can't do that. We have to deliver water downstream. We have limits on our uses instate and we have to deliver the remaining amount to other states. There <u>are</u> flowing rivers -- that is what I am trying to say -- there is a demand placed on us and we have to meet that demand.

A: (Rod Kuharich) The question about recreation raises, to my mind, a dilemma, because $.40 of every recreational dollar is generated from instate citizens. Eighty percent of those citizens live on the Front Range, and those citizens, whether they are on the Front Range or not, certainly need the basic services such as drinking water. I think it further emphasizes the need for a balancing process, because the recreational economy of the small, intermountain communities is so dependent upon the recreational dollar generated on the Front Range that there has to be this balance. The Eagle River Assembly, to my thinking, is one of the unique situations that has evolved where you may see in the future a water project develop to provide water to the ski areas and Vail and Beaver Creek, and to Colorado Springs and Aurora, which I think is kind of unique.

Q: (Jerry Kenny) Rod, you raised the issue of integrated resource planning. One element of that is the demand management side. I ask the municipal representatives to address what their municipalities are currently doing, what their plans are, and what benefit they would expect to receive in issues such as metering rates, nonpotable systems, wastewater effluent and all?

A: (Frank Stephens) By my reckoning, and I think most might agree, the first place you start, with water conservation, for example, is on the economics. You try to get at supply and demand and you make people realize every month what their decisions cost them in terms of water use. Greeley started converting unmetered accounts to metered accounts over ten years ago, and we are also at present overhauling our rate structure. It needs overhauling and improvement to help provide additional incentives for water conservation. You mentioned nonpotable -- partly in an effort to conserve some of these high-mountain supplies like those in the Roosevelt National Forest, we started irrigating some of our public spaces with the local ditchwater. It doesn't place, then, the demand on those high-mountain supply reservoirs. I will admit, however, Greeley does have some more to do in water conservation and we are working on it. As soon as we get our permits and quit doing 2.5 days a week working on our permits, we'll work on more water conservation, I promise.

A: (Rod Kuharich) Colorado Springs, I think, found itself in a unique situation in the '50s, where the community was growing rather rapidly because of the expansion of Fort Carson. The Blue River Project, which was the first transmountain diversion project Colorado Springs was involved in, was not on line. The city council empowered the utilities to mandate water use restrictions, and I don't know of any earlier occurrence of that. We did seek out other sources, and through a public information campaign didn't have to mandate water use characteristics. Then in the '60s we found ourselves a party to the Blue River decree, which mandated use and reuse of our transmountain diversion water as much as feasible, and then we had to report every year to the Bureau of Reclamation on this. That caused us to develop a separate, nonpotable irrigation system. Parks, center parking, and some institutional users such as Colorado College, Union Printers, etc. all were hooked onto this nonpotable system which is still operating today. Anywhere from 10,000 acre-feet of water per year is recycled through that process. So, we have had some experience on demand side management. We recently started a citizens' committee to recommend to council a rate structure. We did away with the declining block rate a decade ago, but we do have a flat rate and there is no distinction between the various categories of users. I think Frank makes a good point -- that the economics of this, the rates that are in place, will be the major driving force in the use characteristics that evolve. Other than that we have xeriscape gardens (USBR gave us an award this year and now we have to do their conservation plan), and there are a lot of things happening everywhere.

Human Water Supply and Environmental Requirements

Remarks by

Ed Osann

Director of Policy and External Affairs
Bureau of Reclamation

I appreciate the opportunity to be here. I would like to speak with you somewhat informally about a number of things that are going on in the Bureau of Reclamation. The Bureau is no stranger to the Colorado Basin or this part of the state. We have a long history and tradition that certainly predates my employment by the Bureau by a good 80 or 90 years.

This is an organization that is undergoing some very fundamental changes. I want to talk to you about that a little bit--without dwelling on a lot of inside baseball--and get into anywhere from two to four issues, depending on how much time we have, that you might find interesting, and that I think are illustrative of the new direction the Bureau is taking.

The Bureau is very much involved, at the initiative of Commissioner Dan Beard, in the government-wide effort that is underway, initiated by the President, on reinventing government. Some of the changes that we have made over the past year have included a 10-percent decrease in our staff and a 12-percent decrease in our budget. We have restructured many of our management practices, and we have eliminated many of the intervening layers of management.

I would like to note the presence of Carol DeAngelis, who has been named the Bureau's Area Manager for Western Colorado. Carol and her counterparts, in 20 or so area offices around the West, together with our five Regional Directors, comprise a new pool of very talented and competent decision-makers for the Bureau. Part of the reorganization that has been underway has been to delegate to our Regional Directors and Area Managers more responsibility for decision making. A principal way that has been accomplished is that the large staff the Bureau has maintained in Denver has basically been moved off line, in terms of the line of authority. Rather than being a corporate headquarters, our Denver office now functions more in the nature of a technical service center. It will provide technical support to our area and regional offices around the West, rather than trying to run those area and regional offices. It is a very different kind of approach. It takes a very different mind set and a very different culture to get more service-oriented. That process is underway, and we have some people who are really diving into the task there.

I've had a lot of exposure to Reclamation projects over the years in my work, as alluded to, with the National Wildlife Federation. What I hadn't been too familiar with was a lot of the people in Reclamation. Since I joined the agency in October I have had the occasion to get out and around and meet a lot of the Reclamation staff, and I have been very pleasantly surprised and impressed. The reinvention effort that's underway is really designed to empower these employees. It is based upon the notion that federal employees are not the problem; the problem has been in terms of governmental gridlock and layers of red tape. The problem has been the system, and good employees need to be placed in a system that is more functional. Delegating responsibility is part of that.

Some of you may have seen on TV news the press conference at the White House where our Sacramento Regional Director, Roger Patterson, was explaining the process of approving a fish ladder, and the different layers of approval needed to be garnered simply to install a fish ladder. It ended up taking more time than the life expectancy of the fish that we were trying to protect with these investments. There's an even worse example than that. We have had underway for over 10 years now the consideration of a project in California at Shasta Dam that would allow for the adjustment of the temperature of the releases from the dam downstream. This would have the effect of improving the habitat for fish. This project has broad support--EPA likes it, the Fish and Wildlife Service likes it, State agencies love it, power users like it, water users don't have any problems with it, the agency supports it, and the Administration supports it. We found that the Shasta temperature control device, as of this Spring, some time around March or April, had had over 450 approvals, and it still wasn't under construction. That was before the first spade of dirt was turned on it.

So we have to do better; we have got to be able to delegate more responsibility to competent people who will be operating with greater accountability for their own decisions. In doing this we can provide better service to all of the constituencies, the traditional as well as the new-found constituencies, of the Bureau of Reclamation.

In the time that we have, I do want to allow some time for Q and A, but we can talk about issues that you might find interesting, that are currently involving the Bureau in different roles, in our effort to shift from being a major civil works construction agency to becoming a premiere water management agency. The first one I would like to start with is one that some of you may be familiar with; it is the recent memorandum of agreement between the three Platte River Basin states of Nebraska, Wyoming, and Colorado, and the Federal Government. That agreement was signed by Secretary Babbitt, Governor Nelson, Governor Romer, and Governor Sullivan about a month ago. This is a product of a consensus-building effort. It is really a landmark agreement, because it is the first time these states have agreed collectively to try to tackle the challenge of managing endangered species and their habitat downstream on the Central Platte River in Nebraska.

I brought a map along here just to lay out for you some of the essential geography. I think it will be probably too difficult to see from the back of the room, but we'll have it around here for the remainder of the day. Essentially, there is critical habitat that has been designated along about 60 miles of what's known as the Big Bend reach of the Platte River in Central Nebraska--the river rising in Colorado, both the North Platte and the South Platte, the North Platte flowing into Wyoming, and the two rivers joining at the town of North Platte, Nebraska, and forming the Platte. The North Platte provides about two-thirds of the water. The South Platte, which relative to the North Platte is largely unregulated, provides a lot of peak flows and is also the principal source of sediment through the Central Platte River. So they each have kind of a distinctive contribution to make.

The Bureau of Reclamation operates the North Platte Projects to produce hydroelectric power and to deliver water to irrigators in both Wyoming and Nebraska. The Bureau also operates, or has built and turned over for local operation, the Colorado-Big Thompson Project, which many of you who are here are familiar with in the South Platte River Basin.

Recent developments brought the issues on the Platte to the attention of the department in a couple of ways. The Department has been an intervener in a Federal Energy Regulatory Commission relicensing action that has been underway for several years, relating to the Kingsley Dam in Nebraska, which is located immediately upstream from the critical habitat reach. Last fall, the Governor of Nebraska asked the Secretary to take a fresh look at a proposed set of operating criteria that the state was supporting for licensing conditions for Kingsley Dam. Not too long after that, it was brought to the Secretary's attention, back in, say December, that several Front Range communities that were seeking renewal of special use permits for water projects in National Forest lands above the Front Range were faced with draft biological opinions from the Fish and Wildlife Service, relating to critical habitat in Nebraska, that called for some rather demanding if not impossible conditions on the operations of these projects. At that point, the Secretary sought the interest of the three Governors in trying to see if it would be possible to take a basinwide approach to meeting downstream habitat needs, rather than forcing each individual applicant to consider perhaps just proportionally the impact of their activities, on a project-by-project basis. Couldn't we do better if we took a basinwide approach?

So, the result was a negotiated agreement among the three states, where they agreed to put together a recovery program. That recovery program will be based upon consensus; each of the signatory parties will have to agree with both the goals of the program and the measures that are developed to carry it out. We expect some really difficult negotiations yet to come, probably taking a year to a year and a half, before a recovery plan can actually be developed. But the consensus process marks one key attribute, and the other is that the states are taking a cooperative approach. No one state, or one user group within a state, will bear a disproportionate burden of meeting the flow objectives that are necessary for the management and recovery of the species in central Nebraska.

The second activity that we have been involved in recently, and spending quite a bit of time on, that some of you are probably interested in, has to do with rules administering the Colorado River, specifically the Lower Colorado River. Under existing federal law, the Secretary of the Interior has a very unique responsibility.

Acting through the Bureau of Reclamation, the Secretary is, in effect, the water master for the Lower Colorado River below Lee's Ferry. In that regard, the Bureau has had rules relating to the administration of water entitlements and water permits. For the last two years or so there has been an effort underway to modify those rules and to expand them to address some topics that has been covered very fully up until this time.

In the early part of May, the Bureau distributed a pre-publication draft of these proposed rules for the Lower Colorado. The elements that are involved here, broadly speaking, are intended to make more efficient use of water that's currently available. The rules are intended to facilitate voluntary transfers of water between willing parties, both within states and across state lines. That has been a real eye opener. Also, irrigation districts and cities who are water users in the Lower Basin would be required to develop and implement water conservation programs that would identify cost-effective opportunities within their systems to use water more efficiently. There's also an issue in the Lower Basin where wells along the river are drawing from the aquifer that is actually fed by Colorado River water. These rules will bring these groundwater users within the system of Colorado River permits.

In addition to that, the other issue that's addressed has to do with the fee structure. We spend many millions of dollars to administer the Lower Colorado. Many of the states have systems for recovering their costs of administering a river from beneficiaries and users. We are proposing something similar to recover the costs for administering the Lower Colorado from the beneficiaries, and from the perspective of the water users this could involve between a dollar and two dollars an acre-foot per year. For folks who have been getting water under the Boulder Canyon Act for twenty-five cents an acre-foot, that's a pretty significant increase.

The issue that has drawn the most attention has to do with transfer provisions. Since the Bureau released the pre-publication draft, relating to interstate transfers there have been two competing proposals put forward, one by Arizona and one by Nevada, to establish a Lower Colorado River water bank. Other states have commented on these ideas, including Colorado. Colorado had some ideas they are suggesting be explored for banking lower basin water in the upper basin, which is kind of an interesting idea. In any event, we didn't actually solicit comments at this stage. We'll solicit comments when the proposed rules go in the Federal Register, but we have comments nevertheless. We are looking at those now and intend to discuss them as early as next week in meeting with the seven basin states.

I think it is important to point out that the Department is not proposing to alter the basic apportionments of the Colorado River among the states. I almost feel that it necessary to say that twice. But we are looking to sort of lubricate the system, to take the current body of law that constitutes the "Law of the River," the compacts, Supreme Court decrees, and statutes, and find ways that they can operate to protect peoples' rights, and yet provide more flexibility to meet current and future demands. That's a challenging issue for us, but one that we really welcome the opportunity to deal with.

A third area that I would like to touch on, one that you have spent some time talking about already today, has to do with water conservation. Commissioner Beard has identified water conservation as basically the highest priority for the new Bureau of Reclamation. We are initiating activities in the area of water conservation in a number of ways. The most widely applicable activity that we have underway is some guidelines that we have out for comment relating to water conservation plans. Under the 1982 Reclamation Reform Act, all of Reclamation's customers--cities, irrigation districts, anybody that has a contract with the Bureau of Reclamation for water--are supposed to prepare and submit a water conservation plan; a plan that has some definite goals and some timetables for meeting the goals.

Up until recently, however, the Bureau had not had any particular standards or criteria, had not evaluated these plans particularly carefully. It was quite clear that not much was being done with these. Expectations were very low, and as a result, we have over 800 paper plans sitting on a shelf somewhere, probably in Denver, that are not doing anybody any good.

Recognizing that this was a problem, when Congress was dealing with a couple of large water projects in 1992, some new approaches were developed. One, with regard to the Central Utah project, was a very ambitious water conservation program laid out by statute. I think you may have heard a little bit about that today or you will at some point during this meeting. It had very specific goals and a timetable for meeting those

goals. Federal funding was provided to help accomplish some of these efficiency improvements, and fairly serious sanctions for nonperformance by the local project sponsor were included. Carrying out that program was deemed to meet the planning requirements of the Reclamation Reform Act.

Congress took a different approach with the Central Valley Project in California, where there is a multiplicity of contractors rather than one large district. Recognizing the failure of the Bureau to effectively implement the authority that it had been given since 1982, Congress directed the Bureau to work with the State of California to develop some criteria for what would constitute an acceptable conservation plan submitted by California water users. The Bureau has done that in cooperation with the state. We came out in April of 1993 with a fairly detailed prescription as to what constitutes an acceptable water conservation plan. There are certain practices that are identified that districts should commit to implementing, and there are other practices, a much longer list of practices, that the district should evaluate and implement if they make sense in that particular area. These guidelines have been out for better than a year now, and we're seeing much better plans come in. In fact, compliance with these conservation guidelines is now being bound into contract renewals. As water service contracts for large and small California water users come up to be renegotiated, one of the provisions that the Bureau is insisting on is that they develop and in fact carry out these conservation guidelines.

That work was largely underway before the Commissioner was sworn in at the end of May. He reviewed the California criteria and said, "This looks like a good idea. Why don't we see what we can do with this West-wide?" So, for the past year the Bureau has been working to take the basic concepts that were developed for a couple hundred CVP contractors and see if they couldn't be put in a framework that would be suitable for 800 or 900 contractors West-wide. The result of that effort is the guidelines that are now out for public comment.

I think one thing that is notable about this effort is that the Bureau of Reclamation isn't attempting to set a specific amount of water that needs to be saved, nor is the Bureau attempting to determine what saved water should be used for. We are simply asking our customers to walk through a planning process to identify for themselves what the potential uses of saved water might be, and to identify for themselves what the value of saved water might be. With that understanding in hand, a much more rational approach can be made about where and how much to invest to save water, because we're not asking people to do this just as some kind of moral statement, although some people may look at it that way. We're asking people to review their systems and identify opportunities for making cost-effective improvements in their own system.

We approach this with a conviction that the conservation effort that we have underway is not simply a device or a tool or pretext to take water from "A" and give it to "B," to take water from farmers and give it to fish, or take water from irrigators and give it to cities. We approach this with a conviction that a well-framed program of conservation and efficiency improvements can benefit and should benefit irrigators themselves, in terms of better service, or reduced costs, or whatever the cost-effective opportunities are on that system. So, that is underway now, and we have received quite a few comments. In fact, we were requested to extend the comment period, and we have to the end of July. We expect to assimilate these and have a final set of guidelines out in the Fall.

The fourth area I would like to mention to you briefly is an initiative that has drawn some attention lately, particular in the Pacific Northwest, although I think this will soon become a matter of West-wide concern, and has to do with a practice called "water spreading." Water spreading is the term that has come to be used for the application of water supplied by the Bureau of Reclamation for unauthorized purposes. It can take a number of forms. It's not one thing, it's probably five or six different things. In some instances, there is water that is supplied to a district from a Reclamation project that is being, in turn, delivered outside the boundaries of the district, or outside the boundaries of the authorized service area of the project. In other cases, there is water that is being delivered to lands that have never been certified as being irrigable. There is a basic statutory requirement that has been in place almost from the beginning of the program that requires that before water supplied by Reclamation is applied to the land, the land must be certified as being irrigable.

In some cases, there is water that is supplied under an irrigation contract that is actually going to some kind of urban or municipal use that may not be specified in the contract, may not be permitted under the authorization of the project, or may be being supplied at an agricultural rate, which may be markedly below the

rate that would be appropriate to charge for municipal use. So these and other instances of water spreading are out there, and are of some unknown proportions.

We also found instances where Reclamation-supplied water is going to lands that didn't have valid current state water rights, where those rights are required. We share with the states an interest in doing a better job of administering our program. We really don't know, because we don't have tools in place as of yet to accomplish a project-by-project, basin-by-basin inventory of what's there. The Inspector General of the Department of the Interior has recently released, I think just this past week, a report that is very critical of the Bureau. Having reviewed over 20 Reclamation projects, they found some instances of water spreading in every project. They determined that the financial impact of this, if you were to assess water users who were applying water in an unauthorized manner, the full cost that could be charged to irrigators, under the Reclamation Reform Act, that the short-fall in dollars to the Bureau is somewhere between $30-40 million. That's just for the ones that they looked at.

It's a significant problem, and in response to the Inspector General, we have agreed to basically do a better job of carrying out the law. We have agreed to a set of timetables, where over the next year and a half we will inventory and develop documentation on a project-by-project basis to determine whether water spreading is going on, or where it is not. That is going to be part of the exercise as well, to clear the air in some cases that there's not unauthorized use going on.

With that inventory in hand, we'll take another year and a half to develop some sort of plan of action, in collaboration with the local water users, as to how they would propose to remedy the problem--either ceasing the deliveries or taking the steps that are necessary under the law to make the deliveries lawful. When those new actions are taken to legitimize, in some cases, uses that have developed, there will be environmental compliance activities that will have to be undertaken. We don't administer one law, we administer many. We are responsible for all of them, actually, so we have to administer not only the Reclamation Act but the National Environmental Policy Act, the Endangered Species Act, the Clean Water Act, and so on. So there will be environmental compliance that will go on in the course of sorting through these issues. It may be that there will be critical resource needs in some basins that will come into play in the disposition of some of these issues--endangered species concerns, or other concerns, or concerns by Native Americans. There has been substantial interest in the Pacific Northwest, on the part of several of the tribes there, that the unlawful or unauthorized use of Reclamation water has had the effect of diminishing the trust assets that are held on behalf of Native Americans. These issues will have to be sorted out as we try to resolve the instances of water spreading.

As of now, we do not have a good set of tools in hand to deal with this problem efficiently. Part of our challenge over the remaining three years will be to develop those in cooperation with the states, interested members of the public, and with water users; things like geographic information systems that can bring this information on how our water is used, where it is used, and key aspects of legal compliance like irrigability, wetlands, and other things. We can bring them on line so that we can administer this more efficiently in the future. We are downsizing; we don't have the ability to administer Reclamation law by keeping data on three-by-five cards in a shoe box somewhere. We can't do it; we couldn't do it when we were fully staffed, we certainly won't be able to do it with a leaner operation. So, the challenge is certainly there in front of us, along with our customers, to kind of walk together into this new era of water management involving improved efficiency, recognition of environmental values, as significant objectives, involving recognition of new and nontraditional constituencies for the Reclamation program.

It's an exciting time to be at the Department of the Interior. I never envisioned a role for myself as a federal bureaucrat, and never particularly planned to go to work for the federal government. But at a time when we've got a President, Vice-President, Secretary of the Interior, Assistant Secretary, Deputy Assistant Secretary, and Commissioner of Reclamation -- basically everybody above me in the food chain -- committed to change, to reform, and to doing a better job, I welcome the chance to join the Bureau of Reclamation at this time.

Questions and Answers

Ed Osann

Q: Untranscribable

A: The question is, "What can be done about the Central Arizona Project (CAP)?" Now that we're four billion and counting, I think, and it's the largest project that is currently under construction. Major elements of it are complete and in operation now. But as it turns out, there has been a significant decline in the capability of the agricultural water users to take water through the project, for a number of reasons; reasons that perhaps the Bureau should have been more attuned to, perhaps the state should have been more attuned to, but here we are. It's 1994 and there are significant problems. In fact, just a couple of months ago we had a first in the Reclamation program: we had the first Reclamation contractor, that is, a water user group that has a contract with the Bureau, declare bankruptcy in Arizona. It was one of the three largest irrigation districts. The second of the three largest has recently slipped into arrears on its payments to the Bureau, so it is a difficult situation.

The Federal Government has an unusual relationship to the Central Arizona Project. We are the financier -- the taxpayers -- you all are the financiers of this project, so we have an interest in getting paid back what's reimbursable under the law. On behalf of several Native American tribes in Arizona, we also have an interest as potential water users of the CAP. So we have an interest in the affordability of the water. That has presented a very difficult duality for us to come to grips with. We have had a series of discussions with state interests, and those discussions are continuing. We don't have a solution wrapped up that will assure repayment, assure affordability, allow flexibility for future Indian water right settlements. These are some of the objectives that we have, but it's not at hand yet. I think it's safe to say that the Department is not interested in, and is not seeking to use, the CAP financial difficulties as a pretext for forcing Arizona to involuntarily relinquish a share of its Colorado River water. It may be that as discussions progress there are opportunities where Arizona might find it to its advantage, financial or otherwise, to agree to more flexibility in the use of its entitlement. They'll have to make that decision and view that in the context of an overall settlement of CAP issues that they believe makes sense from their perspective. My answer is: watch this space. We are still working on it.

Q: Untranscribable

A: The question had to do with one of those statements that Secretary Babbitt makes about pigs flying. The question was, there had been criticism by the Inspector General of the Interior Department over the Bureau of Reclamation's willingness to allow the local sponsors of the CAP to postpone for one year the initiation of their repayment on the project. They made a certain cash contribution, and there were some other arrangements. The Inspector General found that the overall deal shortchanged the government by $20 million, or something like that. The Secretary indicated that he was not going to allow further extension, and there has been no further extension allowed.

Q: Untranscribable

A: This leads us to another Inspector General report. The Department agreed to acquire water for an Indian water rights settlement from one of the other Arizona irrigation districts receiving water from the CAP, the Harquahala Valley Irrigation District. The local sponsor of the CAP served as an intermediary or broker in that arrangement, so that they in effect paid from their funds what was going to Harquahala Valley District to cash them out, so that the federal government could obtain the water for the tribe. Because they served that role, the federal government did not need to use appropriated funds for this water rights settlement, and it could be consummated fairly quickly once the deal was struck. They front-ended some money. What has happened is they actually got a credit for their first year's payment because of money they actually laid out, cash money they actually laid out. So when you get right down to it, we're still waiting for the first dollar to come through the door. The repayment period has

started. It's only by virtue of the fact that they entered into this crediting arrangement that they haven't cut us a check. They are sort of on the runway, but they are not up in the air yet.

Q: Untranscribable

A: The question was related to a topic that had been discussed yesterday, and that is, to what extent is the Bureau entertaining ideas for converting the use of water and irrigation only projects to M and I use, as in the case of the Florida project here in Colorado, and the potential that might hold for providing additional municipal water service to the City of Durango. My answer is, we are open to those kinds of ideas. We have to make sure that we have a firm, statutory basis for doing what may be a good public interest solution, and if we need to seek legislative authority, we will.

Of M and I Conversion, we are going to look at it on a case-by-case basis in the context of the water spreading review, to make sure that we have the authorization that is required for M and I conversions, and to make sure we are getting the appropriate price. We are delivering water right now under ag contracts for just a couple bucks an acre-foot, for essentially municipal purposes, and the Treasury is really getting fleeced. So we have to be good stewards of the financial interests here. But there are promising opportunities, and I would tend to characterize the one that you have described as a very promising opportunity. Our managers will be tasked to work through these issues and make recommendations to us. If they can't proceed with a good public interest solution, because of a statutory problem, then we'll need to recommend to the Secretary and Congress that it be fixed.

The Last Oasis:
An International Perspective on Water Resources

Sandra Postel

Senior Fellow
The Worldwatch Institute

I have to say, coming in as a bit of an outsider to the workshop I have found it to be fantastically open and interesting, and amazing in the sense of the productive exchange of ideas I have heard among such diverse points of view. What I would like to do this afternoon is broaden our telescope a bit and look at the international issues and to try to place the challenges we are facing here in the West in some broader perspective.

I would like to start by asking a very simple question: "What is water?" I would bet that if we went around the room this afternoon and had each person answer that question, we would get almost as many different answers as we have people in the room. I think the reason for that is something very important to our thinking about and our management of water, which is that water is very different from most other material items. It's a commodity like gold, or wheat, or oil. But it is also, and at the same time, the basis of life on this planet, from earth worms to fish to people. As long as water is abundant, there is no conflict at all between these two basically different purposes that water serves. But increasingly we find here in the West, and as I am going to describe a bit today in much of the rest of the world, we're finding that water used as a commodity--for growing our crops, for supplying industries, for allowing cities to keep growing--is meeting head on with that basic, and fundamental purpose that water serves as the basis of life. I think reconciling that conflict is the fundamental challenge that we have in water management today.

When we look around the world today we can see many signs of water scarcity and unsustainable water use. I want to just run through a few of those indicators so that we can see the problems and issues in Colorado as they relate to this broader world setting.

First, if we look at the population-water equation on a global basis, country by country, what we find now is that there is an increasing number of countries in which population levels have gone beyond that which the available water supply can adequately sustain. That's an assessment that we make based on a rule of thumb hydrologists often use, that we need about 725 gallons per person per day, and I'll explain that in just a second, to meet water needs on a sustainable basis. Sounds like a lot of water. We don't use anywhere near that amount, you and I, but it's the water that we need to grow food, to supply industries, to support a modest standard of living, to supply our households needs, and to maintain a somewhat healthy aquatic environment.

What we find when we look at population levels in relation to water supplies, using that rule of thumb, is that there are now 27 countries in the world that fall below that minimum benchmark. Twelve of them are in Africa, the continent with the most water-scarce countries in the world, and given current rates of population growth in Africa, there will be 300 million people in the year 2000 living in water-scarce countries in Africa. We have all been seeing the pictures of refugees in the paper from various countries in Africa. It's a frightening prospect to me that given the increasing water scarcity on this continent, we might be seeing only the tip of the iceberg of this problem.

The Middle East is the most concentrated region of scarcity in the world. Nine out of fourteen countries in the Middle East are already in this water-scarce category, and as in Africa, population is growing very fast. Tensions are already high in all three of the major river basins in the Middle East: the Nile, Jordan, and the Tigris Euphrates river basins, and the potential for conflict over water exists in each. In none of them have we yet seen the achievement of a water-sharing agreement between all the parties involved that sets forth a fair allocation of water in those river basins, so it is a very real political and security issue in this part of the world, as in other parts of the world.

We look at water supply and sanitation, and find that still today we have one billion people in the world without access to a safe supply of drinking water, something you and I take very much for granted. One out of

three people in the developing world still lacks this basic human service. Moreover, we are looking at a population in the developing world that is growing by 85 million per year -- roughly equal to adding another Mexico each year.

We look at irrigation trends and find something which I find deeply troubling. For most of modern history the amount of land we have been bringing under irrigation has expanded faster than population has, which has meant that there is an increasing amount of irrigated land per person on the planet. That situation is no longer true. Since 1978 we've been more or less in the situation where irrigated area per person on the planet is declining, and that means that meeting future food needs is going to be that much more difficult. Per capita irrigated area peaked in 1978 and has fallen about 5 percent since then, and from the work that I have done on irrigation trends around the world, I don't think that this trend is going to reverse any time soon. The economic and environmental costs of expanding irrigation are very high and increasing in much of the world. I think that trend of less and less irrigated area per person is likely to continue, and it raises a red a flag for future food security on the planet.

We look at the water resource base itself and we see many physical signs of water scarcity and unsustainable water use. More and more rivers aren't reaching the sea; we know a lot of examples of that from the western U.S. Water tables are falling in more and more parts of the world. If we look geographically we can find this problem becoming very pervasive in North China, in much of India, parts of Thailand, parts of Indonesia, and of course much of the western United States, the Middle East, and North Africa. This is a very pervasive problem, and one of the clearest signs that water use is unsustainable. By definition we can't over-pump groundwater indefinitely; at some point there has to be a balance.

We see fossil aquifers undergoing depletion in some parts of the world. We have in our own country the case of the Ogallala. The area which has been most depleted is in Northwest Texas, the southern part of the Ogallala, where we've seen the depletion of about a quarter of the water. In this part of Texas, since the mid '70s a combination of low commodity prices, higher energy costs, and steadily falling water tables has brought about a third of the irrigated land in northwest Texas out of irrigation. Saudi Arabia, certainly the country most heavily dependent on fossil groundwater, meets about 75 percent of all of its water needs from mining groundwater. It is basically depleting a one-time water reservoir, and hydrologists in Saudi Arabia estimate that the water supply may be gone in about 50 years. Saudi Arabia contributes about 4 million tons of wheat, very heavily subsidized wheat, to the world market. That's not a sustainable part of the food system if the water supply on which it depends is not sustainable.

And finally, we see a host of ecological consequences from our whole approach to managing water in the past. Globally, water use -- the amount of water we have taken out of rivers, streams, lakes, aquifers -- has tripled since 1950. And the way we have met that rising demand has been to steadily go out, as we all know, and build larger and more numerous water projects --dams, river diversions, and so forth. These water development schemes are in many cases magnificent testimonies to human engineering skills, but they have also created an illusion of abundance in areas that are actually very scarce. The environmental price from that creation of an illusion of abundance is just now coming to light.

We can cite many examples of this around the world. Certainly one of the most dramatic is the situation of the Aral Sea Basin in central Asia, in the former Soviet Union. This is an ecosystem the size of Ireland that has been virtually destroyed by excessive diversions of the two major tributaries coming into the Aral Sea to grow cotton in the desert. This was a planned decision: the central planners in Moscow decided 30 years ago that the water contributing to the Aral Sea would be more valuable if diverted to grow cotton, and to some extent fruits and vegetables, in the desert. With the siphoning off of those two major sources of inflow to the Areal Sea, this sea, which used to be the fourth largest inland water body in the world, has now lost half of its surface area and three quarters of its volume. It is incredibly saline, all of the native fish species have disappeared, and the fishing industry which once supported about 60 thousand jobs in this region is now gone. The health conditions as a result of agricultural pollution, the lack of water to dilute pollution, and so forth, are unimaginably bad in this region. So it is a case, I think, where we can see severe economic, social and human health impacts following close upon the heels of the destruction of an ecosystem upon which we all depend, upon which the people in that region depend. This is an extreme example, the Aral Sea, but it is not an isolated one. We can cite a lot of examples of this conflict between the use of water as a commodity and the function of

water as the basis of life. We can see it here in the Colorado River delta, again another ecosystem that is increasingly decimated by excessive diversions and population upstream. We can see it in South Florida with the Everglades, in Africa in the Okavango Delta, and in many, other cases.

We also see many subtle signs of ecological damage. Here in North America, the American Fisheries Society now lists 364 species of fish as threatened, endangered, or of special concern, the vast majority of them at risk because of habitat destruction. We all know that a couple of years ago, I think it was 1992, there was just one Snake River Sockeye Salmon that made it up through the Columbia River system to its primordial spawning ground in Idaho at Redfish Lake, just one example again of this conflict between use of water as a commodity to meet our needs and the function of water as the basis of life.

Putting water use on a more sustainable footing and protecting the integrity of the aquatic environment that we all depend upon is going to take some fundamental changes in the way we manage water. I think the basic thrust of that set of changes is going to be much greater focus on demand management than on the traditional supply side as the first line of attack in meeting new water needs. The second half of my book is devoted entirely to a look at the technologies and methods and policies that we can use, all of which are already up and running, to help us do better with what we have already developed in the way of water supply. The overriding message of Last Oasis is that in most cases measures to conserve water, to reuse and recycle water, and to use water more efficiently are the most cost-effective and environmentally sound ways of meeting new water needs when we compare supply side options and demand management options on an equal footing and level the playing field and look at them as equal alternatives.

From the numerous examples I looked at to come to those conclusions, I found many in which farmers were able to reduce water needs on the order of 10 to 50 percent; industries, surprising to me, on the order of 40 to 90 percent; and cities by a third with little sacrifice, if any, of economic output or quality of life. On a global basis, agriculture accounts for about two thirds of all the water that we use, so it is a natural place to look for water savings. World-wide irrigation efficiency is estimated to average about 40 percent, and I gather from the talk yesterday about agricultural water use in Colorado it's not that different here, that farm efficiency averages about 40 percent. We have heard a lot the last few days about how much of this so-called waste is really wasted. A lot of the waste does turn out to be supply for a downstream user, but I think what we are forgetting in that equation is the quality issue, the instream values, and also the fact that some of that inefficient use is in fact evaporation losses that really aren't serving a beneficial purpose.

I think when we look at the technologies that are beginning to be used more and more like surge irrigation, like the LEPA (Low Energy Precision) technology for sprinklers, we do find that there are real savings to be gained from more widespread use of these applications. I have looked at the use of these technologies in northwest Texas, which as I mentioned has been facing the problem of the Ogallala aquifer depletion, and there farmers have turned quite heavily to those two measures: surge irrigation for the traditional gravity-type irrigation, and LEPA retrofit for center-pivot sprinklers. Water savings have averaged about 25 percent, and most farmers have recouped their initial investment within a matter of years, usually less than three years, and so it has been a very productive investment on their part. We have seen expanding use of drip irrigation worldwide; we have seen a 28-fold increase, in fact, since the '70s in the use of this highly efficient irrigation method. It is not applicable to all crops, but it is applicable to many more crops than it is currently being used on. Worldwide, we are still using drip irrigation on less than one percent of all the irrigated crop land -- a very small amount. So we have a long way to go make better use of this technology.

I mentioned a minute ago that I was surprised at the savings in industry. We haven't talked a lot about industry here, but I was particularly surprised at what I found in industry when I began looking at the savings there. It turns out that pollution control laws that we have passed in this country and most of the other industrial countries have been very good incentives for industrial water conservation. What pollution control laws have done is made it more economical for factories and manufacturing processes to recycle water internally rather than continually discharge it to the environment. So it has had the indirect effect of promoting a lot of industrial water conservation and recycling. I took a look at Japan, for example, and found that 30 years ago, in about 1965, Japan was getting just $21 worth of output from each cubic meter of water used in industry. In 1989, the latest year I could get good figures for, they were getting $77 worth of output from each cubic meter of water in industry. That means that Japan roughly tripled its industrial water productivity, the amount of output per unit of

water in industry, in about three decades. Some of this is due to shifts in the economy away from heavy industry and towards service industries and electronics and so forth, but a lot of it is more recycling in the heavy water-using industries -- iron and steel, pulp and paper, the chemical industry--and so forth. I also took a look at California, which I found to be very interesting. As we all know, California has just come off of a six-year drought, and that has forced industries in California to really push the envelope of industrial water conservation. I found, looking at some studies of industries that were done in the San Jose area, that several of the major industries in the area, IBM, Hewlett Packard, Tandum Computers, and a number of others, were able to reduce their water use in various processes on the order of 30 to 90 percent in about 5 years. And this is on top of those average savings we have already seen for the nation as a whole. It suggests to me again that we really have quite always we can go in industrial water conservation. The payback on those investments was in no case more than 12 months, so it was a very, very economical investment.

Municipal water use, the water used in cities, suburbs and towns around the world, accounts for less than one-tenth of all the water that is used globally, so it is not a lot of water in an absolute sense. But as we all know, this water is very difficult and expensive to collect, treat, distribute, recollect, treat, and discharge to the environment. So it takes a big toll on the environment surrounding cities and it is very expensive to supply this high-quality water. There are a number of cities around the world, and I talk about a number of them in the book, in which conservation has been made a serious and long-term part of water planning. I talk about programs in Boston, Jerusalem, Singapore, Los Angeles, Mexico City, and Waterloo, Canada. I found Boston's program to be particularly interesting and important because it is a city that is not in a dry area, and so it shows that conservation is not just an emergency response to drought conditions or a last resort-type measure. It is a cost-effective alternative in long-term water planning. Boston, about ten years ago, ran into a problem of really bumping up against the limits of the supplies that had already been developed, and began looking toward a diversion from the Connecticut River, the biggest river in New England, to meet its new water needs. Environmental groups were concerned about the effects on the salmon restoration efforts in the state and about water quality problems, so it urged the Massachusetts Water Resources Authority to look at some alternatives. When they did, and began to put together a really comprehensive water conservation program, they had tremendous results. They did door-to-door retrofitting, industrial water audits, education, and very importantly, finding and fixing leaks in their own water distribution network. They were able to cut water use in the greater Boston area, an area of about 2 million people, by 20 percent in five years. That's a pretty dramatic savings. It brought water use back to the level of the late '60s, and indefinitely has delayed the need for that diversion from the Connecticut River. The conservation program saved water at half of the cost of the diversion project, so again it was a not only an environmentally sound way to meet those needs, but economically very attractive also.

I think it's going to take much more effective use of a variety of different policy tools and management tools to see these kinds of savings spread more widely. I think it is going to take more effective use of pricing, more effective use of marketing, regulations, and education to begin to put in place this kind of more environmentally sound water management strategy that we are talking about. Fortunately, I think we are beginning to see some interesting moves in these directions, and I have learned about a few more in the couple of days that I have been here. One that I am interested in watching myself is the case of the Central Valley in California. As most of you know, the Central Valley Project Improvement Act, which was passed at the end of 1992, basically overhauls that very large federal project in California, and it does what I think are three very important things. First, it sets a tiered pricing structure so that farmers have more incentive to conserve water. Second, it allows Central Valley farmers to market their water. Third, and I think this is very important, it designates 800,000 acre-feet of water from the project to the environment, and this water comes off the top of the project. So, in dry years fisheries, wetlands, and riverine habitat, especially in the Sacramento River Valley, will be guaranteed a minimum amount of water. We haven't seen the shakeout from this law yet. We haven't see the full effects of it in a dry year. But I think it is an important new law. It combines three of those important policy tools --pricing, marketing, and regulations -- to achieve what I think will be a more sustainable water use situation in the Central Valley. I have read the blueprint for reform that the Bureau of Reclamation recently has put out under Dan Beard, and I think we are going to see more of this kind of approach from the Bureau in the Western U.S. generally.

In the area of urban water conservation we have seen some strong moves in recent years toward the setting of water efficiency standards, and again, I think these are important. In the United States, we have seen

16 states take it upon themselves to implement water efficiency standards for basic plumbing fixtures, but it wasn't until late 1992 that the federal government decided this is something we should do for the nation as a whole. So it has established minimum standards for basic household water appliances -- toilets, faucets, and shower heads. Unfortunately, the implementation of this law has lagged. It was supposed to take effect in January '94, but there's been no enforcement. Once implemented, these efficiency standards will build conservation into urban infrastructure. We are talking about roughly a 30-percent household savings as a result of these new standards which urban water planners can build into their plans.

Even with all these technologies and policies, I still think we are going to need to go a bit deeper if we are going to achieve this more sustainable pattern of water use. We need to address, I think, a more fundamental question that I raised at the outset. What is water? We need to begin to develop not only new water policies but some common vision, some common ethic of what we want to achieve in a sustainable pattern of water use. I think the essence of that ethic will need to be making the protection of the aquatic environment, upon which our economic and social activities depend, the centerpiece of water planning. Making that kind of a shift would dramatically change our approach to water management. It would mean that we would no longer ask as readily how we can further manipulate the hydrological system to meet our needs, but rather how we can meet legitimate needs while accommodating the ecological requirements of the hydrological system, of the aquatic environment.

I have learned some interesting new ways to begin thinking about that from the discussions of the last few days. I would like to see the western U.S. really be on the cutting edge of these kinds of solutions. As I see it, the challenge now is to put as much human ingenuity, and there's a lot of it, into learning to live in balance with water as we have put historically into engineering the water system to meet our needs. I think there is a lot of potential to do that. The challenge for us, I would submit to you as water professionals or as concerned citizens, is to begin to exercise some leadership in helping create that common vision and that more sustainable pattern of water use.

Questions and Answers

Sandra Postel

Q: (Moderator) I want to come back to the point that you began and ended with -- sustainability. What struck me is something that we talked about for several days, the process of change. In the past, I think, we have talked about the process of change in trying to make hydrology fit cultural needs. What I am hearing from you is, perhaps, a new direction -- trying to make culture fit hydrologic needs. I am a science fiction fan, of the Dune series in particular, and I wonder if you have any suggestions. You left with a challenge, but do you have any specifics as to how we do make culture fit hydrology?

A: I think values are really at the heart of what I am talking about. I have been excited to hear the thrashing out of a variety of opinions here. I think it is a healthy exchange, and the only way we are going to get to the beginnings of a common vision of what we are trying to achieve with water management. Values underlie most of what we have been hearing. Beginning to make them explicit, to the extent that we can, is helpful. What I feel strongly about is that we cannot ignore the ecological requirements of a healthy aquatic environment. When we do, the extreme case that we get is an Aral Sea situation. We don't know in many cases when you begin to cross those thresholds where the ecosystem no longer functions in a way that allows for a healthy human economy on top of it. And we may not be able to foresee it in many cases. What I feel, given that we are stretching the limits of nature's water supply in so many places, is that we need a water planning process that puts the protection of the aquatic environment at the center and not at the end of it. Let's make sure we don't screw up the environment too much. That is when we can get into trouble as we keep pushing the limits further and further. At some point, there is very little to protect, and we will suffer the consequences from that. I personally think we should protect species for their own sake, but even if I didn't, there would be fairly dramatic and economic consequences to overstepping the limits as we are now seeing in places like the Aral Sea basin. Those are the kinds of discussions that I would like to see take place.

Q: (Unknown) You closed with the observation that we should balance the health of aquatic systems with meeting legitimate needs. The problem is finding any agreement on what constitutes a legitimate need. We do it now by thrashing it through the political system, and that is going to go on forever without agreement on what is legitimate. Is there a way out of that?

A: I think that is at the heart of what a conference like this is all about. Again, it gets to the question of values. If we look globally across societies or internally within societies, we find tremendous inequities in the use of water. As water gets increasingly scarce, what we are finding is increasing competition for water. The pie can't be expanded to divide any further, so we have to reallocate from within. We see families in Phoenix, Arizona using about 20 times as much water, sometimes 3,000 gallons per day, as a family in Kenya in exactly the same climatic region with seven inches of rain a year, which is walking five miles just to collect a few buckets of water to meet basic human needs. What is a legitimate human need is, I think, a culturally determined figure. But as we begin to deal with these very real problems of competition and conflict in the world, we are going to have to deal with this. I think the Jordan river basin is going to be one of the first areas that comes up. Israel uses twice as much water per person as the Palestinians do on the West Bank. As they begin to hammer out some kind of equitable water-sharing agreement, that question has to be asked: What is a legitimate amount of water in this water-scarce river basin? We haven't quite faced that question yet in the Western U.S., but we are going to get there. We are going to have to start asking that question of ourselves. I don't have an answer for it, but if we are placing the environment at the heart of what we are talking about, then we are saying, this much must protect the aquatic environment. Again, that is not an easy number to determine. One of the questions this morning was how the 400,000 acre-feet as the target figure for the Platte River was determined? What is that process? It is not an easy one, but I think it is one of the questions we are going to have to grapple with. I think we will get some help, in a certain way, from some parts of the world that are facing that question right now. It is one of the questions I am going to work on the next year or two as a research process -- to try and ask that question in these water-scarce river basins.

Q: (Unknown) Your research is fascinating. I would like to ask a question about the municipal use side of it. You mentioned retrofit plumbing, detection and industrial audits. Colorado Springs implements that right now in their municipal supply. We are starting an educational program, xeriscape gardening and things like that, heading in the direction of industrial audits as well as pretreatment of discharge from industrial plants. But you didn't mention metering and wastewater reuse, the concept of being 100 percent metered to your customers, the concept of wastewater reuse either as a dual distribution supply for irrigation or with the technology that exists, microfiltration or reverse osmosis, where you treat wastewater directly for potable uses. What have you seen in your research regarding metering and wastewater reuse?

A: I guess I didn't mention metering because I do take it as a given now. I think metering is a baseline. We need to have metered water if we are going to do much with conservation at all. If people don't have a sense of how much they are using and how much they are paying, we are not going to get very far with any conservation measures. I think metering is absolutely essential; I think in most, if not all, cases it will pay for itself. I can cite a number of studies to show that, but I think that is the case. With regard to wastewater reuse, I think we are going to see more and more of it. I need to think that issue through a bit more myself.

The Public Trust Initiative - Serving the People or Binding Their Hands?

Jerry Swingle

Colorado Vice President
Four Corners Action Coalition

I took the liberty of taking a slightly different approach to the discussion topic that Lucy had phrased. The version that I came up with is, "The Water Initiative: Water as a Vital Natural Resource-versus-Valuable Natural Commodity: Finding the Balance." I think that is really what one part of the Public Trust Initiative is about. It is trying to determine if we are talking about predominantly a commodity or predominantly a natural resource. I think, obvious to all of us, we are talking about a mixture of both. The real discussion is about the degree and the extent to which we have any control over that relationship. I come to this particular topic with a background of very limited involvement in water. I am not a water engineer and I am not an attorney. Those disclaimers are out of the way. I will avoid discussing water law to the extent that I can and still be involved in a discussion of a significant water law issue, that being the Initiative.

I'm the Colorado Vice President of Four Corners Action Coalition. I have been involved with a group called Taxpayers for the Animas River for a number of years on a subject that doubtless none of you have heard of before (sarcasm): the Animas La Plata Project. We're on the other side of that particular project. In the process, I have had a fair bit of experience with some of the local water districts. I have to say, for the most part, it has not been a very gratifying experience, with people who have taxing capability and who extensively represent all of our interests in that area. The latest insult, as an earlier speaker mentioned, was when we discovered that not once but for the second year in a row, $5,000 had been given to the effort to reform the Endangered Species Act. By reform, you can read "reform" if you're in favor of that, and you can read "gut" if you're looking and reading a little bit between the lines.

I did want to bring one other kind of formative experience to you, and I phrased it in my summary as the "Dry River and the Dead Eagle." About three or four winters ago, someone call me out of the blue, because I am involved in a number of local citizens' groups. He said he had a problem, and wondered if I could help with it. At that point I had very little if any relationship to water, but here was a citizen, an average individual, calling and asking, "Can you help?" I said tell me what it is, and let me find out. He said, "I live on the la Plata river, and I just went out for a walk along the river. I discovered a couple of things that concerned me. First, the river is absolutely dry. Second, I stumbled across the carcass of a dead eagle in the river, where the river would be." I said I was not sure exactly what was going on, and asked him for more information. He said, "The river is diverted two and one-half miles above my house into a major ditch. It returns to the river below my home, about two and one-half miles. For that five-mile stretch of the river it is absolutely dry and dead." There is normally water running in the river at this time of year (January, I believe). I asked, "Is there no water running the river?" He said, "No it is literally all being diverted." My question then was why? Why, in the middle of January or early February, would anyone be diverting the entire remainder of a river? I never did get a good answer to that question. I had some conjecture from some friends and people with a little bit more familiarity, but the only real answer was that they might be using the water running through that ditch to reduce their maintenance in the spring. They keep the ditch running clean so when they have to gear up when the agricultural season comes, they won't have to do as much work. That experience, for me, has become kind of a metaphor and a symbol of how we deal with water in the West, or how we have unfortunately dealt with water in the West. We use it as a tool. We use it as a way to get something that we want or facilitate something that we want to do. We consider the environmental impacts as a secondary consideration.

To get to the Public Trust Initiative, let me just give you a brief overview. It has three primary provisions. (1) It advocates for and would create in our constitution a strong public trust doctrine in the area of water. (2) The second component would mandate elected water districts and require an election for any significant change in those districts. (3) Instream flow rights are defended. Let me quickly read the section with regard to the Public Trust Doctrine. I have a feeling that's going to be at the heart of our discussion today. It reads that:

The State of Colorado adopt and defend a strong Public Trust Doctrine regarding the public's rights and ownership in and of the waters of Colorado, and that the public further requires that the State of Colorado protect and defend the public's interest in waters from unwarranted or otherwise narrow definitions of its waters as private property, but however, that the rights of the uses of water by the matter of appropriation not be hereinafter denied.

The intention of the initiative and the reason it is included there is because we intend, and have so testified on a number of occasions, that the Public Trust Doctrine be administered as a dual, equal, and conjunctive doctrine along side the Doctrine of Prior Appropriation. We are not suggesting usurpation, an overturning, or an elimination in any sense whatsoever. What we are saying is these two can exist, can be administered side by side, and ought to be. With regard to that intention, here is just a bit of testimony from my cosponsor, Richard Hamilton:

The intent of the sponsors is that Public Trust Doctrine and the Doctrine of Prior Appropriation be a conjunctive system of water usage for the protection and utilization of all of Colorado's water interests. The intent here is not to diminish the Doctrine of Prior Appropriation, but is to bring the Public Trust Doctrine forward to act as an equal and as legally compelling a doctrine as that of Prior Appropriation.

Is that possible? You will hear some arguments that it is really not possible. Let me give you the answer that the courts in California came up with when this question was raised in the case, National Audubon versus Superior Court of Albany County. I am quoting from the court's finding:

In our opinion, both the Public Trust Doctrine and the water rights system embody important precepts which make the law more responsive to the diverse needs and interests involved in the planning and allocation of water resources.

They go on to say:

To embrace one system of thought and reject the other would lead to an unbalanced structure, one which would either deprive, as a breach of trust, appropriations essential to the economic development of this state, or deny any duty to protect or consider the values promoted by the public trust.

What they are saying is that they find both of them, in fact, absolutely essential. Again, that's in a state that had that capability, and this initiative would give us that capability.

There is an expression that we have all heard about being damned by faint praise. I'm going to take a little attribution by virtue of strong criticism. In the filing by several individuals, some who are here today representing their various political employers, the following statement was made in requesting a rehearing before the Secretary of State.

Public trust is an extremely far-reaching doctrine, the adoption of which would revolutionize Colorado water law more than any change since the adoption of the Colorado constitution more than a hundred years ago.

Here is the question that you have to answer for yourselves. If it is that significant a change, is it a move forward, is it a move backward, or is it basically just churning up things? We believe that it is a significant move forward. It has also been pointed out to us on a number of occasions that this could in fact be renamed the Water Lawyers' Full Employment Act, because it offers the prospect of litigation, ad nauseam. I am not going to touch that subject other than to say if that is what the net result is, with public value and public interest represented through the Public Trust Doctrine, I say let us get on with it.

Why does Colorado need this initiative? Here is a brief bit of history. I am taking this from a doctoral

thesis submitted by Donald Hensel, "The History of the Colorado Constitution." This shows how we got to where we are with regard to the lack of a clearly defined Public Trust Doctrine and the Prior Appropriation system as we know it today. I am quoting from his dissertation:

> *The irrigation committee declared in the first section of its preliminary report that all natural waters were the property of the people, and "dedicated to their use forever.*

Obviously, that is not what happened. What happened was that an individual by the name of Wells, a territorial supreme court judge who was on this committee, stepped in and said, "You're in for trouble if you say that under this constitution and in this territory." Again, quoting from the dissertation:

> *To openly declare all natural water suddenly public would lead directly to court battles and certain judicial defeat is what Wells argued. Such a provision, Wells argued, would give corporations the opportunity to seize the waters of this state to the grave injury of the people.* (emphasis added)

Let me reiterate the rationale behind which we did not declare the water of the state to belong to the people. "Such a provision," Wells argued, "would give corporations the opportunity to seize the waters of the state to the grave injury of the people."

I apologize for not doing the research, but there may be someone here who can tell us approximately what percentage of the water in this state is in fact still controlled by corporations. I think it would be an interesting and informative bit of information. I don't know the answer, and I apologize. A number of issues have been raised in this workshop that I think all advocate for the intent of this Public Trust Doctrine, and I just want to skim through them quickly.

(1) Evolution into values: again, if the public interest and public values are to be reflected in water law, we have to find a better mechanism for reflecting those than to have them brought in peripherally to discussions among vested interests, arguments, or law suits.

(2) The shift from agriculture, among others, to land use development and residential housing.

(3) The increased focus on and importance to our state of tourism, recreation-aesthetics.

(4) The need for collaborative water development that embraces all of the conflicting interests and conflicting values.

(5) Watershed management as an approach to dealing with watershed issues, specifically focusing on healthy ecosystems.

(6) Urban build-out: we have heard that word used a few times over the last few days. The problem is, some of the urban giants have a growth rate of which we have no conception and an ultimate size of which we have no clear indication. I think it is ultimately important that we ask, for instance, What is build-out for Colorado Springs? Is it 440,000? Is it 600,000? Is it 1.6 million? What are the limits? What are the constraints?

(7) The need to work with lower basin states and federal agencies. At some point we have to get to a discussion of values with these folks. It is my contention and firm belief that the Public Trust Doctrine will ultimately push us toward recognition of changing values; toward healthy negotiations, cooperation, and healthier collaboration; and toward consultation with federal agencies with an emphasis on the rights of the State of Colorado. We are talking about a resource that belongs to all of the people as well as the natural environment of the state.

I had hoped to talk a little bit about "takings" and "givings" for a clever introduction. I will simply go on to point out that this constitutional amendment will not, in fact, rescind any of the existing constitutional

protection clauses. They will remain both in federal and state. Also, Article 16, Section 5 will not be disturbed except by the addition of this public trust provision which says that "the water of every natural stream not heretofore appropriated within the state of Colorado is hereby declared to be the property of the public, and the same is dedicated to the use of the people of the state." That's what it says. It does have a caveat that Steve will point out shortly that says "not already appropriated," and I'll grant that. In essence, the constitution points to the fact that the water is in fact a resource that belongs to all of us.

We do have "givings." We have protections that are afforded by government that benefit all of us. In any discussion of "takings" you should be careful to ask, "Is there something you are gaining by virtue of the regulation you (the claimant) are at the present moment decrying?"

If any of you have seen land advertised with the phrase, "Surrounded by national forest on three sides," and you have looked at the price structure, you know exactly what I am speaking of. That's not a taking of value, it is in fact a giving of value to that particular individual. There was reference earlier to a popular movie some years back, Field of Dreams. There is a phrase that occurred throughout that movie, "Build it and they will come." It has been reiterated here over the last few days. I am going to make a slightly pejorative description here. The skewed economics of urban development have caused us to focus on the profitability of water as one way of determining its highest and best use. I think that is an evaluation that we all have to be very careful to examine, challenge, and question. Why? Because it undervalues, outbids, or overpowers other values that have less valuable advocates. I am talking about the environment.

I heard someone use an expression, "depletion to extinction." Had I not received that call about the La Plata River, I don't think I would understand "depletion to extinction," and I now surely do. Community and societal values frequently get left behind. Quality concern -- if quality can never be a concern for limiting the appropriation of water, what have we done? What does that say about our values -- our health and recreation values?

There are some values, some commodities, and some things that, while it would be uncomfortable, we could live without. I know people who live without TV. I even know people who live without electricity. Occasionally we do without pizza. Some people do for a long while without money or telephones. When you get to food, you can live without food for a few weeks. When you get to water, you can live without it for a few days, which, by the way, applies to most of the biotic community. If you get to air it is a matter of minutes. What we're talking about is not a commodity which we can necessarily move back and forth with impunity, because we depend on it for life and survival.

We need to ask a few questions about the "urban giant." We need to ask, What is build-out? What do you contemplate as being all that we can allow for in the way of growth? How much growth is enough, and how much growth is too much? How do we define those? Unmanaged growth, as a number of writers have pointed out, is in fact the behavior of the cancer cell. That may be a rude analogy, but it is something that I think we all need to consider.

There was an earlier Bureau of Reclamation slogan, "total use for greater wealth." What we have to think about now is, do we really want to shift over to total use and reuse or greater growth? Is that, in fact, our focus? Manifest destiny is a myth that dies very, very hard. Among the five fastest growing cities in the country are Tucson, Las Vegas and Phoenix, where some households use about 3,000 gallons of water a day.

Whose agenda is this, anyway? There are lots of answers historically, and I don't think I need to belabor this group with the history of how we got where we are in terms of water development and vested interest in water. This initiative will provide a place at the negotiating table for more of the public's values and the interests of Colorado's citizens -- a field day for lawyers, I am afraid, but at least some of them will be arguing on behalf of the broad public values that we all espouse.

Are water issues too complex or too important to entrust to average citizens? We have heard an argument somewhat to that effect today. A quote from Thomas Jefferson:

I know of no safe repository of the ultimate powers of society but the people themselves, and if

we think them not enlightened enough to exercise that control with a wholesome discretion, the remedy is not to take it from them, but to inform their discretion.

Despite Douglas Bruce, I am going to say that the initiative process is in fact a valuable aspect of the check and balance system we have in Colorado governance.

I'll close with this -- a slightly different perspective on the value and relationship to the land and the natural resources from another culture and another time. This is a perspective which, although only 130 years old, is so different from ours and is so foreign to our way of thinking and behaving that I am going to ask you to listen to it in two ways. I am going to ask you to listen to it first with your ears and your mind, and then listen to it with your heart. This is Chief Seattle -- some of you have read or heard this.

The President in Washington sends word that he wishes to buy our land, but how can you buy or sell the sky? The land? The idea is strange to us. If we do not own the freshness of the air and the sparkle of the water, how can you buy them? We are part of the earth, and it is part of us. The shining water that moves in the streams and rivers is not just water, but the blood of our ancestors. If we sell you our land, you must remember that it is sacred. The water's murmur is the voice of my father's father. The rivers are our brothers; they quench our thirst; they carry our canoes, and feed our children. So you must give to the rivers the kindness you would give to any brother. Will you teach your children what we have taught our children, that the earth is our mother? What befalls the earth, befalls all the sons of the earth. This we know: the earth does not belong to man; man belongs to the earth. All things are connected, like blood that unites us all. Man did not weave the web of life, he is merely a strand in it. Whatever he does to the web, he does to himself.

THE PUBLIC TRUST DOCTRINE: What it is, where it came from, and why Colorado doesn't (and shouldn't) have one

*Stephen H. Leonhardt and Brent A. Waite**
Fairfield and Woods, P.C.
1700 Lincoln Street, Suite 2400
Denver, Colorado 80203
(303) 830-2400
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A ballot initiative has been proposed which would adopt, by constitutional amendment, a "strong public trust doctrine" in Colorado. Many lawyers and water experts, let alone most voters, are uncertain what that means. This paper reviews the roots and evolution of the public trust doctrine, and the contrasting rejection of the doctrine as inconsistent with legally preferred appropriation rights in Colorado. It will conclude by examining the proposed public trust ballot initiative in this framework.

A rancher on the dry Arizona Strip recounted the range wars fought over water on those desert lands north of the Grand Canyon. He summarized: "There are three scarce things of value out here--gold, women, and water. If the government has to take two of them, why then, leave the water."

The rancher's words capture the essence of the continuing struggle over western water. First, without water life itself, let alone development, is impossible in the West. Water development has been the foundation of Colorado's economy, from its early settlement continuing to its present cities and towns, farms, industry, and recreation economy. Second, Colorado's arid climate, in contrast with most other states, requires more intensive water development. The basic precept of economics--demands exceed supply--applies acutely to water in the West. Competition for water is fierce; there is not enough to satisfy everyone's desires.

Finally, and especially relevant to the public trust doctrine, water wars have lost none of their importance or intensity, and governments (local, state, and federal) usually are in the thick of the fray as combatants or arbiters. There may be no more notorious or enduring water war than that fought over Los Angeles' water diversions from California's Owens Valley, immortalized in the movie "Chinatown." In the most recent battle of that continuing war, the California Supreme Court provided a new "weapon," one ultimately more effective at stopping the flow of water to Los Angeles than the irate Owens Valley ranchers' dynamiting or

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* Stephen H. Leonhardt is a director, and Brent A. Waite is an associate, with the law firm of Fairfield and Woods, P.C. Both practice primarily in the area of water and environmental law and related litigation.

occupation of the aqueduct years ago. This new "weapon" is the archaic and once almost-forgotten public trust doctrine, judicially given new life and force.

The public trust doctrine, originally of limited and circumscribed application, has been judicially expanded into a doctrine which could undermine the foundations of appropriative water rights in Colorado, as it has in California. In essence, the public trust doctrine has become a trump card judges or government officials can play to deny new water rights or abrogate existing water rights in the name of environmental values, while hoping to avoid the constitutional mandate to pay just compensation for those water rights.

The Colorado Supreme Court soundly rejected the first modern attempt to apply the public trust doctrine to Colorado.[1] Two cases now before the Court involve parties who failed to persuade trial courts to apply a public trust doctrine to water rights; on appeal, they have made similar arguments but shied away from advocating the "public trust doctrine" as such.[2] Even if the Court does not reconsider its rejection of the doctrine, the voters may have an opportunity to address the issue, if the proposed initiative appears on the ballot.

I. Roots of the Public Trust

A. The Traditional Public Trust Doctrine--Navigability.

Defining the public trust doctrine is a little like trying to nail Jello to the wall. Boulder's own Professor Charles Wilkinson, a proponent of the doctrine, describes it as "complicated," noting it comes in "many different forms."[3] Professor Joseph Sax, who first advocated an expanded role for the public trust doctrine, said: "Certainly the phrase 'public trust' does not

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[1] People v. Emmert, 597 P.2d 1025 (Colo. 1979).

[2] Arapahoe County Board of Commissioners v. United States, Case No. 92SA68 (the "Union Park" case seeking diversion rights above Gunnison)(High Country Citizens' Alliance and others argue on appeal for consideration of "public values" in awarding new conditional water rights); Aspen Wilderness Workshop v. Colorado Water Conservation Board, Case No. 93SC740 (A.W.W. argues the CWCB had "public duties" as a "trustee" of its instream flow water rights, requiring water court review of its decision to exercise less than the full decreed amount of such rights on Snowmass Creek).

[3] C. Wilkinson, "The Headwaters of the Public Trust: Some Thoughts on the Source & Scope of the Traditional Doctrine," 19 Envtl. L. 425, 426 (1989) (hereinafter "Headwaters of the Public Trust").

contain any magic such that special obligations can be said to arise merely from its incantation."[4] Regardless of its alluring name, the public trust is hardly a trust at all.[5] In fact, it eludes classification.[6] It is "not so much a substantive set of standards ... as it is a technique by which courts may mend perceived imperfections in the legislative and administrative process."[7] The doctrine is primarily a creation of the courts and has evolved into different forms in different jurisdictions.

The public trust doctrine is most easily understood in its "traditional" or "core" form.[8] Traditionally, the public trust doctrine was a common law restraint on government, preventing sovereign authority from defeating public access to navigable waters and the lands beneath them.[9] The doctrine developed in a monarchy (England) to prevent the English Crown from transferring title in the submerged lands underlying navigable waters.[10]

English common law apparently did not trust the Crown to resist the temptation of bestowing favors on its supporters by deeding them title to submerged lands and thus control over the navigation of the overlying waters.[11] The Crown could convey its other holdings to its favored subjects,[12] but public navigation of English waters was so important, historic, and entrenched that the common law restraints on the Crown (following the Magna Carta) included

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[4] J. Sax, "The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention," Mich. L. Rev. 471, 485 (1970).

[5] G. Gould, "The Public Trust Doctrine & Water Rights," 34 Rocky Mtn. Min. L. Inst. § 25, at 25-10 (1988).

[6] J. Huffman, "A Fish Out of Water: The Public Trust Doctrine in a Constitutional Democracy," 19 Envtl. L. 527 (1989) (hereinafter "Fish Out of Water").

[7] J. Sax, "The Public Trust Doctrine in Natural Resources Law: Effective Judicial Intervention," 68 Mich. L. Rev. 471, 509 (1970).

[8] See Headwaters of the Public Trust at 426-27.

[9] See Gould, supra note 5, at 25-11; M. Blumm, "Public Property & the Democratization of Western Water Law: A Modern View of the Public Trust Doctrine," 19 Envtl. L. 573, 580 (1989).

[10] See "Fish Out of Water" at 541.

[11] See "Fish Out of Water" at 550.

[12] See "Headwaters of the Public Trust" at 430-31.

protection of public access to navigable waters by preventing conveyance of the underlying lands.[13]

The foremost American case on the traditional Public Trust Doctrine is the U.S. Supreme Court's 1892 decision in Illinois Central Railroad Co. v. Illinois.[14] In 1869, the State of Illinois granted to the Illinois Central Railroad Company its right and title to the submerged lands of Lake Michigan beneath Chicago's harbor. This grant was made to allow the railroad to develop the harbor and waterfront. Illinois later underwent a change of heart and sued the railroad, claiming the state still held title to the submerged lands and the right to develop the harbor. Illinois relied on the public trust doctrine to argue that it had never truly granted title and exclusive control of the Chicago harbor and waterfront to the railroad.

The Supreme Court agreed:

> It is the settled law of this country that the ownership of and dominion and sovereignty over lands covered by tide waters, within the limits of the several states, belong to the respective states within which they are found, with the consequent right to use or dispose of any portion thereof, when that can be done without substantial impairment of the interest of the public in the waters.[15]

The Court then held that this same doctrine applied to "public, navigable water, on which commerce is carried on between different states or nations" because any distinction between tidal and such navigable waters would be "arbitrary and without any foundation."[16]

The Court explained that the state held title to lands submerged under navigable waters in a different fashion than other lands:

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[13] See "Fish Out of Water" at 561. There is controversy over whether the Crown could actually divest itself of title to lands underlying navigable waters. See "Headwaters of the Public Trust" at 431, n. 31. One authority states that alienation of title to submerged lands was categorically prohibited, while another states that transfer of title was prohibited only if the effect was to impede public access to the navigable waters. See id. Whatever the correct position, the cornerstone of the doctrine was preserving public access to navigable waters.

[14] 146 U.S. 387, 13 S. Ct. 110 (1892).

[15] 146 U.S. at 435, 13 S. Ct. at 111 (emphasis added here and in other quotes, unless otherwise noted).

[16] 146 U.S. at 436, 13 S. Ct. at 112.

> It is a title held in trust for the people of the state, that they may enjoy the navigation of the waters, carry on commerce over them, and have liberty of fishing therein, freed from the obstruction or interference of private parties.[17]

The Court then delineated the constraints on a State conveying title to these lands:

> The trust devolving upon the state for the public, and which can only be discharged by the management and control of property in which the public has an interest, cannot be relinquished by a transfer of the property. The control of the state for the purposes of the trust can never be lost, except as to such parcels as are used in promoting the interests of the public therein, or can be disposed of without any substantial impairment of the public interest in the lands and waters remaining.[18]

Thus, under the traditional public trust doctrine, the state may convey title to lands beneath navigable waters, but must retain sufficient control to assure the purpose of the trust is not substantially impaired. Notwithstanding the language or intent of any conveyance of these submerged lands, "there always remains with the state the right to revoke those powers and exercise them in a more direct manner, and one more conformable to its wishes."[19]

"There can be no irrepealable contract in a conveyance of property by a grantor in disregard of a public trust, under which he was bound to hold and manage it."[20] Thus, the public trust doctrine is an extreme example of "caveat emptor" or "buyer beware." Every grant of title to lands beneath navigable waters is, whether or not the conveyance says so, subject to the state's inalienable power to revoke its conveyance for trust purposes.

It is a remarkable doctrine, to say the least, that prohibits a state from disposing of its own property as it wishes, and allowing it to renege on conveyances even if at the time of conveyance the state fully intended to part with fee title to the property. It also places an enormous burden on parties dealing with the state: conveyances of property by the state cannot be taken at face value, but are continually subject to an implied and inalienable right of revocation.

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[17] 146 U.S. at 118, 13 S. Ct. at 119 (emphasis added).

[18] 146 U.S. at 453, 13 S. Ct. at 118.

[19] 146 U.S. at 453-54, 13 S. Ct. at 119.

[20] 146 U.S. at 460, 13 S. Ct. at 121.

Such a doctrine might cause private parties to cease dealing with a state unless the application of the doctrine was narrowly limited. Thus, the "navigability" requirement embedded within the traditional Public Trust Doctrine limits it to obvious needs for navigation and commerce:

> The principle of the common law to which we have adverted is founded upon the most obvious principles of public policy. The sea and navigable rivers are natural highways, and any obstruction to the common right, or exclusive appropriation of their use, is injurious to commerce, and, if permitted at the will of the sovereign, would be very likely to end in materially crippling, if not destroying, it.[21]

Illinois Central was decided based on Illinois law, not federal law.[22] Its holding has been adopted by most state courts that have encountered similar issues. An Arizona court counted up to 38 states that had concluded a state holds lands beneath navigable waterways in trust for the public.[23] However, it remains to the states to define what waters are "navigable,"[24] and to "recognize private rights in [public trust lands] as they see fit."[25]

B. Who Made the Public Trust King?

An extraordinary characteristic of the Public Trust Doctrine is that its legal basis and origins are unknown. Courts and commentators have struggled with this question.[26] This is

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[21] 146 U.S. at 458, 13 S. Ct. at 120.

[22] Appleby v. City of New York, 271 U.S. 364, 395 (1926) (reaching a contrary result under New York law); Gould, supra note 5, at 25-12.

[23] Arizona Center for Law in Public Interest v. Hassell, 172 Ariz. 356, 837 P.2d 158, 167 n.13 (Ariz. Ct. App. 1991).

[24] J. Stevens, "The Public Trust: A Sovereign's Ancient Prerogative Becomes the People's Environmental Right," 14 U.C. Davis L. Rev. 195, 202 (1980).

[25] Phillips Petroleum Co. v. Mississippi, 108 S. Ct. 791, 794 (1987).

[26] See "Headwaters of the Public Trust"; "Fish Out of Water" at 539-45; J. Huffman, "Trusting the Public Interest to Judges: A Comment on the Public Trust Writings of Professors Sax, Wilkinson, Dunning & Johnson," Denver U. L. Rev. 565, 567 & n.16 (1986) (and cases cited therein).

remarkable considering that the Public Trust Doctrine can operate as an almost super-constitutional restraint on, or empowerment of, state governments (in those jurisdictions where it has been held to apply). But neither the United States nor the state constitutions mention such a trust.[27] Neither has it been, except in rare instances, adopted by statute.[28] Absent express adoption, the doctrine still operates as a surprising limit on states' sovereign power to allow private rights in state property.

Various explanations of the source of its adoption have been offered.[29] One apparent source is suggested in Illinois Central: the common law of England preserved navigability of tidal waters, and this constraint on title passed to the original Thirteen Colonies upon independence. The doctrine has been applied to other states because they entered the Union "on equal footing," implicitly taking title to tidelands from the United States but subject to the limits inherent in the United States' title.[30] However, "the Supreme Court will not impose the public trust doctrine on any state, even as to the beds of navigable waters."[31] State constitutions are commonly cited as potential sources, but only by inference from references to navigation or public ownership.[32]

Absent constitutional sources, many consider the doctrine to be a natural law or an inherent limitation on government that is commonly and mutually understood though unexpressed. For example, the Romans' Justinian Code is frequently cited for the imposition

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[27] See "Fish Out of Water" at 545; Blumm, supra note 9, at 576-77, n. 12 (lists of relevant state constitutional provisions but no express declarations of public trusts).

[28] See Blumm, supra note 9, at 587-89 (discussing statutory construction with no citation to express adoptions of the public trust). Arizona recently adopted a statute limiting waters considered navigable for public trust purposes and limiting public trust values to commerce, navigation, and fishing. Ariz. H.B. 2589 (41st Legis. 2d Reg. Sess., ch. 277, 1994).

[29] Professor Wilkinson, for example, says the public trust doctrine "derives from constitutional, statutory, and common-law sources." "Headwaters of the Public Trust" at 426, n.6. See also "Fish Out of Water" at 528-29; Gould, supra note 5, at 25-11 to 25-16.

[30] Cinque Bambini Partnership v. Mississippi, 491 So.2d 508, 511 (Miss. 1986), aff'd sub nom. Phillips Petroleum Co. v. Mississippi, 108 S.Ct. 791 (1988); see also "Fish Out of Water" at 539; cf. "Headwaters of the Public Trust" at 439-448 (criticizing the "equal footing" rationale).

[31] Gould, supra note 5, at 25-13.

[32] See "Fish Out of Water" at 545-55; Blumm, supra note 9, at 574, 576.

of the trust,[33] though no one seriously would argue that any U.S. jurisdiction has adopted Roman Law (even if some are influenced indirectly by it). Professor Wilkinson seems to support this concept of inherent limitation; he describes several countries' "special treatment to major bodies of water," the concepts of which "have ancient roots."[34]

> Professor Harrison Dunning probably stated this proposition accurately:
> What [the courts] may be saying ... is that the public trust doctrine limits legislative freedom because it is an implied state constitutional doctrine, one that springs from a fundamental notion of how government is to operate with regard to common heritage natural resources. That is, government must protect public access to such resources unless there is a solemn decision to the contrary.[35]

The search for sources grows as the public trust doctrine expands beyond its traditional scope.[36]

Most of these explanations, however, are unpersuasive.[37] Moreover, they do not justify imposition of such a doctrine in Colorado, where the state constitution expressly guarantees the property right to appropriate waters of the state for beneficial use. Creative legal propositions cannot impose a public trust doctrine contrary to such an express constitutional guarantee.

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[33] "By the law of nature these things are common to mankind--the air, running water, the sea and consequently the shores of the sea." (Institutes of Justinian 2.1.1., quoted in National Audubon Society v. Superior Court of Alpine County, 33 Cal. 3d 419, 658 P.2d 709, 718, 189 Cal. Rptr. 346, 355 (1983) (the Mono Lake decision). This quote from the Justinian Code opens the monograph of the proponents of the current Colorado public trust initiative, explaining their concept of a "strong public trust doctrine."

[34] "Headwaters of Public Trust" at 428-29.

[35] H. Dunning, "The Public Trust: A Fundamental Doctrine of American Property Law," 19 Envtl. L. 515, 523 (1989). Professor Wilkinson summarizes: "The real headwaters of the public trust doctrine, then, arise in rivulets from all reaches of the basin that holds the societies of the world." "Headwaters of the Public Trust" at 431.

[36] The type of law embodied in the Public Trust Doctrine is also unclear. Some suggest what the name implies: it is trust law. Others contend it to be constitutional law, or administrative law. And some say it is a matter of property law: an implied easement for public navigation.

[37] See "Fish Out of Water" at 534-60.

II. A Fish Out of Water:[38]Different Needs and Different Principles for the West

A. Beyond the 100th Meridian: Navigability and Western Rivers.

On a fine July day in 1869, "Captain" Samuel Adams stood on the banks of the Blue River near Breckenridge, congratulating the forward-looking people of that town for helping him ready his expedition with four boats and 10 men. Adams purportedly had spent time boating the Lower Colorado River in a small steam powered stern wheeler, and he was convinced that reports of large chasms and impassable churning waves upstream on the Colorado were fanciful tales of unfaithful spies sent to examine the Promised Land.[39] Captain Adams was convinced the Colorado River was to become the Mississippi River of the West, connecting Western States in a grand continual stream of commerce. Adams also believed that smooth water covered the Colorado River from its headwaters all the way to the Ocean. He had tried to join up with Major Powell's expedition, but Powell and his men did not take him seriously and rebuffed his attempt to join them. Adams commenced his own expedition to prove the navigability of the Colorado River through the Western States.[40]

After launching their boats, Adams and his crew had scarcely floated a few miles past the confluence of the Blue River and Tenmile Creek when they unexpectedly ran into Boulder Creek rapid, where they lost much equipment.[41] A little further downstream, two of their boats were destroyed. With two boats remaining and a crew depleted by deserters, Adams continued on to Gore Canyon.[42] Adams at least had the common sense not to try to float through Gore Canyon, but he still lost his remaining boats trying to get through the canyon. He also lost all but two of his men to desertion. The remaining adventurers built rafts and continued, but after losing successive rafts and more equipment and provisions, they finally admitted defeat

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[38] Our apologies to Professor Huffman (see note 6, supra).

[39] See D. Wheat, The Floater's Guide to Colorado 41-42 (1983); W. Stegner, Beyond the Hundredth Meridian, John Wesley Powell and the Opening of the West (1954).

[40] Wheat, supra n. 39, at 41-43.

[41] In today's rafting terms, these rapids rate as mild class III--potentially fun whitewater, but hardly threatening.

[42] Gore Canyon, by contrast, is solid Class V and even Class VI water, the limits of rafting itself. Several mandatory portages exist in this section of the river for those expert paddlers who attempt this stretch of the Colorado River. The canyon was first run by raft in 1977.

somewhere above the confluence of the Eagle and Colorado Rivers.[43] Had Adams continued, he soon would have run into the deadly cascading rapids in Glenwood Canyon above today's Shoshone Power Plant. Still ahead, of course, were the dark waves of Westwater Canyon and the enormous haystacks and hydraulics of Cataract and Grand Canyons.

Captain Adams' disastrous adventure was the result of his false assumption: that Colorado's largest river was navigable. In fact, no river in Colorado has ever been recognized as navigable in fact, or under state law.[44] This fact has particular importance under Illinois Central, which defined a navigable body of water as one sustaining commerce between different states or nations.[45]

Captain Adams' hard lessons also highlight the simple truth which gave rise to the appropriation doctrine: rivers and man's needs for water are different west of the 100th Meridian, rendering navigability a fantasy. East of that line (which crosses western Kansas), water is more plentiful, feeding streams that really have been used for navigation.[46] Not faced with more urgent needs or scarce supplies, eastern states' powers and laws were based on riparian rights and navigability. "Reasonable use" of water (the basic riparian right) would never seriously affect the flow of the large navigable streams.

But west of the 100th Meridian, navigability generally ends. With it ends the basis for imposing a public trust doctrine as a historic and extra-constitutional restraint on states' power to allow private rights in their resources. The rivers of the West are not like those of the Midwest or East. In their natural state, they flood in late spring and taper off to trickles by midsummer. Some western rivers may now provide excellent sport for whitewater enthusiasts, but their nature was never that of navigable rivers; nor was navigation a common public value inextricably intertwined in the fabric of settlement between the high plains and the Sierras. The reasons for which common law judges protected title to lands submerged under tidal or navigable waters are absent west of the 100th Meridian. Water is scarce. It must be diverted from its

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[43] Wheat, supra note 39, at 42-44.

[44] See People v. Emmert, 597 P.2d at 1027 (Colo. 1979); In re German Ditch & Reservoir Co., 56 Colo. 252, 139 P. 2 (1914).

[45] 146 U.S. at 436, 13 S. Ct. at 112; contrast the Clean Water Act's "Alice in Wonderland" definition of "navigable waters" as "the waters of the United States . . . ." 33 U.S.C. § 1362(7).

[46] Professor Wilkinson, in emphasizing the importance of navigable waters, recounts the critical role such navigability played in the history of the country. But the waters mentioned are those west of the 100th Meridian. "Headwaters of the Public Trust" at 431-39.

course to be used, and must be stored to be used optimally. Weighed against this necessity, Captain Adams' dream of Colorado navigation is foolish and frivolous. The traditional Public Trust Doctrine has no practical application here.

B. Colorado's Constitution, Prior Appropriation, and Its Rejection of a Public Trust Doctrine.

Colorado water law is grounded in the right of prior appropriation, which is constitutionally guaranteed. Unlike most other states, Colorado's constitutional declaration regarding public ownership of unappropriated waters is expressly and exclusively for use by appropriation:

> The water of every natural stream, not heretofore appropriated, within the state of Colorado, is hereby declared to be the property of the public, and the same is dedicated to the use of the people of the state, subject to appropriation as hereinafter provided.[47]

The Colorado Supreme Court holds that this provision "simply and firmly establishes the right of appropriation in this state."[48] This declaration is paired with the express constitutional right to appropriate water: "The right to divert the unappropriated waters of any natural stream to beneficial uses shall never be denied."[49]

Colorado courts have long emphasized the property nature of appropriative water rights, holding that appropriation creates a "most valuable property right" in the exclusive use of water.[50]

> A priority to the use of water for irrigation or domestic purposes is a property right and as such is fully protected by the constitutional guaranties relating to property in general.[51]

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[47] Colo. Const. art. XVI, § 5.

[48] People v. Emmert, 597 P.2d 1025, 1028 (Colo. 1979).

[49] Id. § 6.

[50] Navajo Devel. Co. v. Sanderson, 655 P.2d 1374, 1377-78 (Colo. 1982); Nichols v. McIntosh, 19 Colo. 22, 27, 34 P. 278, 280 (1893).

[51] Farmers Irrig. Co. v. Game & Fish Comm'n, 149 Colo. 318, 323, 269 P.2d 557, 559-60 (1962).

Advocates of public ownership have argued, without success, that implied and inherent constitutional limitations such as the public trust doctrine limit this express constitutional guarantee of appropriative rights. The Colorado Supreme Court in People v. Emmert[52] followed the state constitution in refusing to apply the public trust doctrine to Colorado's waters.

That case involved rafters who were charged with trespassing on private property for floating down a section of the upper Colorado River, not far from Gore Canyon (the site of Captain Adams' debacle). In defense, the rafters claimed a public easement on the river, based on the public trust doctrine. The Colorado Supreme Court rejected this defense: "[W]e do not feel constrained to follow the trend away from the coupling of bed title with the right of public recreational use of surface waters as urged by defendants."[53] The court elaborated:

> We recognize the various rationales employed by courts to allow public recreational use of water overlying privately owned beds, i.e., (1) practical considerations employed in water rich states such as Florida, Minnesota and Washington; (2) a public easement in recreation as an incident of navigation; (3) the creation of a public trust based on usability, thereby establishing only a limited private usufructuary right; and (4) state constitutional basis for state ownership. We consider the common law rule [of private ownership] of more force and effect, especially given its longstanding recognition in this state.[54]

This decision also was based on the recognized fact that the upper Colorado River was non-navigable.[55]

Colorado's constitutional declaration of "public property" in unappropriated water is simply for "use of the people," not for navigation but by appropriation. The only state protection required is protection for appropriation, not protection from use or for preservation's own sake.[56]

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[52] 597 P.2d 1025 (Colo. 1979).

[53] 597 P.2d at 1027.

[54] Id.

[55] Id. at 1026.

[56] "If anything, [such] constitutional language imposes a trust on water for appropriation." Gould, supra note 5, at 25-33 (emph. in original); see also Hobbs & Raley, "Water Rights Protection in Water Quality Law," 60 U. Colo. L. Rev., 841, 880-81 (1989).

III. California Broadens Its Public Trust Revocation Powers.

A. Beyond Navigation

After the Illinois Central decision, the Public Trust Doctrine continued as a relatively narrow and uncontroversial legal doctrine.[57] Limited to questions of navigability and title to submerged lands, it had no reason to assume a more prominent role in the legal arena. While the doctrine was not ignored or dismissed, it did not expand in scope until recently.

In 1970, Professor Joseph Sax published his landmark law review article, "The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention."[58] Professor Sax's article detailed the history of the public trust doctrine and urged courts to apply the doctrine expansively, taking it far beyond its traditional foundation of navigability. The article had its desired effect and sparked a renewed interest in the doctrine, not in its traditional form, but expanded to encompass a much larger scope in natural resources law.[59]

Since that time, the Public Trust Doctrine has expanded most rapidly, and drawn the most attention, in California. Three landmark cases have resulted in radically expanded application of the doctrine. The first case was Marks v. Whitney,[60] which upheld a claimed public trust easement over certain tidelands for which California had long ago issued a patent. The court held that any patent of tidelands was subject to an implied public trust easement.

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[57] The history and impact of the Public Trust Doctrine could be compared to that of the federal reserved rights doctrine. See H. Dunning, "The Public Trust Doctrine and Western Water Law: Discord or Harmony?," 30 Rocky Mtn. Min. L. Inst. § 17, at 17-43 to 45. Reserved water rights were long considered to be an obscure peculiarity in Indian law under Winters v. United States, 207 U.S. 564 (1908). The reserved water rights doctrine, however, exploded in scope with the case of Arizona v. California, 373 U.S. 546 (1963), expanding the reserved water rights doctrine to all manner of federal land reservations and withdrawals. Disputes over federal reserved water rights have kept water lawyers busy ever since.

[58] 68 Mich. L. Rev. 471 (1970).

[59] Professor Michael Blumm more recently commented that the public trust doctrine "represents every law professor's dream: a law review article that not only revived a dormant area of the law but continues to be relied upon by courts some two decades later. Nearly twenty years ago, Professor Sax initiated modern interest in the public trust doctrine with publication of his seminal article." M. Blumm, "Public Property & the Democratization of Western Water Law: A Modern View of the Public Trust Doctrine,"" 19 Envtl. L. 573, 574 (1989).

[60] 6 Cal. 3d 251, 491 P.2d 374, 98 Cal. Rptr. 374 (1971).

More significantly, the California Supreme Court set the public trust doctrine adrift from its anchor of navigation purposes, holding that the public trust easement was not limited in scope to the traditional uses of "navigation, commerce and fisheries."[61] Rather, the court now treated the public trust as an amorphous public right changing to accommodate whatever use (or, more accurately, non-use) a reviewing court thought appropriate for the public:

> The public uses to which tidelands are subject are sufficiently flexible to encompass changing public needs. In administering the trust the state is not burdened with an outmoded classification favoring one mode of utilization over another. There is a growing public recognition that one of the most important public uses of the tidelands--a use encompassed within the tidelands trust--is the preservation of those lands in their natural state, so that they may serve as ecological units for scientific study, as open space, and as environments which provide food and habitat for birds and marine life, and which favorably affect the scenery and climate of the area.[62]

The easement imposed by this California expansion of the public trust doctrine was not for navigation needs, but for protection of the tidelands from those needs--not for use, but for prevention of use, leaving the natural environment intact.[63]

The second case was City of Berkeley v. Superior Court of Alameda,[64] which tried to untangle the Gordian Knot of applying the doctrine many years after the fact to the San Francisco Bay. In an effort to develop the Bay, the state long ago had conveyed title to numerous parcels of the Bay that were in fact submerged by the high tide reach of navigable waters. Many areas had been filled in, and the shore and high tide line had been pushed far outward in many instances.[65] California's Land Board and the City of Berkeley, which had long previously conveyed tidelands by patent to private owners, then asserted a public trust against the private owners.

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[61] 6 Cal. 3d at 259, 98 Cal. Rptr. at 796.

[62] 6 Cal. 3d at 259-60, 98 Cal. Rptr. at 796.

[63] The leap taken by the court in Marks v. Whitney was crucial to Marks, the holder of the patent to the tidelands. Under the court's decision, he could not fill and develop the property because of the public easement. If navigation were the concern, Marks' plans to build a marina would have furthered the trust purpose. 6 Cal.3d at 261, 98 Cal. Rptr. at 797.

[64] 26 Cal. 3d 515, 606 P.2d 327, 162 Cal. Rptr. 327 (1980).

[65] 25 Cal. 3d at 522-26, 26 Cal. Rptr. 330-33.

The California Supreme Court had settled the question long before, having ruled in 1915 that under an 1870 act of the California legislature, these lands were conveyed in fee simple, free of the public trust.[66] Notwithstanding that the San Francisco Bay had been extensively developed based on the law (affirmed by the court's 1915 decision) that the lands were conveyed free of the public trust,[67] the court in 1980 overruled its previous cases and held that a public trust did exist over those tidelands of the San Francisco Bay.[68]

The difficulty was how to apply the public trust doctrine after the fact, now that much of the patented land had been filled in and developed as a harbor. With no apparent legal premise, the court legislated its own solution: those parcels already filled and developed were deemed free of the public trust, while those parcels not filled in remained burdened by the public trust.[69] The public trust continued only where the property "is still physically adaptable for trust uses."[70]

The retroactive effect of City of Berkeley raises more difficult questions. The court did not directly address whether its decision created a constitutional "takings" problem--whether the government (here, aided by the court's reversal of prior law) was depriving private owners of property without just compensation, violating the Fifth Amendment to the U.S. Constitution. Nevertheless, the court left little doubt as to its view of such a takings claim: because regulation already made it very difficult to fill the tidelands, "the economic loss to the grantees of such lots is speculative at best and is clearly outweighed by the interests of the public."[71] Moreover, judicial recognition of a public trust, even many years after people relied on contrary decisions, implies the land really never was conveyed free of the trust. Upholding the public trust, at least where it has always existed (even if unrecognized), "takes" only what the government has always had.

Perhaps the case's greatest significance, however, is the court's justification for its Solomonic application of the public trust doctrine in City of Berkeley. That justification was

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[66] Knudson v. Kearney, 171 Cal. 250, 152 P. 541 (1915); see also Alameda Conservation Ass'n v. City of Alameda, 264 Cal. App. 2d 284, 70 Cal. Rptr. 264 (1968)(same holding).

[67] 26 Cal. 3d at 536-38, 162 Cal. Rptr. at 339-40 (J. Clark, dissenting).

[68] 26 Cal. 3d at 524-35, 162 Cal. Rptr. at 332-38.

[69] 26 Cal. 3d at 534-35, 162 Cal. Rptr. at 338.

[70] 26 Cal. 3d at 534, 162 Cal. Rptr. at 338.

[71] 26 Cal. 3d at 535, 162 Cal. Rptr. at 339.

that belated recognition of the public trust doctrine should not undo an irretrievable commitment of resources, one that was inextricably intertwined with the development of the resource itself. If the tideland was filled, it was filled, and not even the mighty public trust doctrine, which can reverse even the inherent legislative power of the state, could undo the past physical change. Even this last restraint, though, would soon be attacked.

B. California's Public Trust: and Appropriation Rights: The Saga of Mono Lake and Los Angeles.

The public trust doctrine's newfound potential to undo past commitments of water use rights comes from California's well-known Mono Lake case--National Audubon Society v. Superior Court of Alpine County,[72] involving the saga of Owens Valley and Los Angeles. In its 1983 Mono Lake decision, the California Supreme Court first applied the public trust doctrine to appropriative water rights, with major potential implications for Colorado. The court held that Los Angeles' 1940 permit for water rights to streams feeding Mono Lake, which had been used since 1941, must be reconsidered in light of the effects Los Angeles' diversions had on the ecosystem of Mono Lake.

Mono Lake is a large saline body of water in Eastern California, situated at the foot of the Sierra Nevada. Many believe it is an area of unique natural beauty and features. The lake's saline waters support a population of brine shrimp, which in turn serve as food for millions of local and migratory birds. The lake is also a stopping point in the pathway of migratory birds, and an important breeding ground for California gulls.[73]

Just south of the lake is the Owens Valley, from which Los Angeles has diverted much of the water flowing off the east slope of the Sierra Nevadas into the city's aqueduct. Los Angeles supplemented its supply of water by extending its aqueduct and diversions to the Mono Lake basin. Los Angeles first acquired (by condemnation) the riparian rights of landowners adjoining Mono Lake, and then obtained state permits (the California equivalent of water decrees) to divert from four tributary streams. From 1940 to 1970, the city diverted on average 57,000 acre-feet per year from these streams above Mono Lake. The city completed a second aqueduct, and between 1970 and 1980 its annual diversions from these streams averaged 99,850 acre-feet.[74]

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[72] 33 Cal. 3d 419, 658 P.2d 709, 189 Cal. Rptr. 346.

[73] 658 P.2d at 715-16.

[74] 658 P.2d at 714.

Environmental groups sued to stop the diversions, based on observed and anticipated environmental effects. The lake surface had dropped considerably, and experts predicted that if the diversions continued unabated, the lake would shrink to roughly half its original size.[75] The diversions and reduced lake size threatened to increase the salinity of the water, reduce the supply of lake algae and brine shrimp and thus food for the birds, reduce the birds' water supply, and expose their nesting grounds to predators.[76] Reduction of lake size was also alleged to impair the lake as a unique scenic, recreational, and scientific resource.[77]

Although the streams from which Los Angeles diverted were not themselves navigable, the court imposed the public trust doctrine because the streams fed Mono Lake, which the court held was navigable for brine shrimp fishing. If the doctrine prevents filling navigable waters when it destroys navigation, then extracting water which is needed to maintain navigable waters downstream also triggers the doctrine because it "destroys navigation and other public interests," the court reasoned.[78] Thus, in California, the public trust leaped beyond its traditional restraint on alienation of title to submerged lands, to cover rights not only in navigable waters, but also in waters tributary to navigable waters. Moreover, the public trust now protected water not only when needed for navigation, but also for the new environmental, recreational, and ecological values of the trust: "[I]t prevents any party from acquiring a vested right to appropriate water in a manner harmful to the interests protected by the public trust."[79]

The court recognized that appropriative water rights and the public trust doctrine were on a "collision course"[80] and that either doctrine fully applied would exclude the other.[81] In the end, the court favored the implied public trust doctrine and required that it be taken into account in awarding and reconsidering appropriative water rights. Appropriative rights could

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[75] 658 P.2d at 715.

[76] 658 P.2d at 715.

[77] 658 P.2d at 716.

[78] 658 P.2d at 720.

[79] 658 P.2d at 727.

[80] 658 P.2d at 712.

[81] 658 P.2d at 726; 189 Cal. Rptr. at 346.

sometimes be awarded even if they foreseeably could harm public trust uses, but the state had to consider the public trust and could award rights that would harm trust uses only in cases of "practical necessity."[82] The state could always revoke, curtail, or otherwise modify the water rights to protect trust interests, whether or not it had previously examined thoroughly the effect on the public trust.[83]

Subsequent events in the Mono Lake case reveal the far-reaching and costly effects of the court's decision. After another eleven years of litigation, the final result remains unknown. For several years, Los Angeles has been enjoined from diverting any water from the basin, and the lake level has recovered slowly. The state, after years of environmental study, determined the lake surface should rise another 6.5 feet, ignoring evidence that populations of gulls, migratory birds and brine shrimp are now at record levels. The state legislature decided to compensate Los Angeles for its loss, authorizing $36 million for alternative water supplies. To obtain this money, Los Angeles agreed to give up the right to one-third of its historic diversions. The fate of the remaining two-thirds (60,000 acre-feet) remains undecided.[84]

Mono Lake hardly ever was used for traditional "navigation."[85] At the opposite end of the Owens Valley, however, once was a similarly briny lake which was truly navigable--Owens Lake. The Owens Lake supported steamboat navigation during a silver mining boom from 1872 to 1882.[86] Los Angeles' diversions of water from the Owens Valley, however, left the lake completely dry in 1924. With no real concern for navigation, Los Angeles was never ordered to curtail its diversion to replenish water to the lake. Instead, during exceptionally wet years, Los Angeles discharged water it did not need or could not take back to the Owens River, which began to fill up the dry lake bed. This flooded the facilities of mineral developers leasing the lake bed from the state, and they sued. Los Angeles ultimately was enjoined from restoring

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[82] 658 P.2d at 728; 189 Cal. Rptr. at 365.

[83] Id.

[84] "Mono Lake--Not On the Level," in Aqueduct 2000 (Metropolitan Water District of Southern California, March/April 1994).

[85] Actual navigation on Mono Lake was limited to occasional harvesting of brine shrimp. 658 P.2d at 719, 189 Cal. Rptr. at 356.

[86] See L. Clark & G. Clark, High Mountains & Deep Valleys: The Gold Bonanza Days 106-09 (1978).

water to a lake that once had supported navigation.[87] The contrasting fates of Owens Lake and Mono Lake[88] confirm the pragmatic limit of the public trust doctrine the California Supreme Court recognized in City of Berkeley: even the public trust cannot reverse state-permitted development that has permanently altered the resource.

This result confounds the traditional public trust doctrine, which shackled the state's ability to harm the trust purpose of navigation. Under the Mono Lake case, by contrast, California can do what no state could do under the public trust doctrine: revoke rights granted, in good faith, in non-navigable streams to protect non-navigation uses; except that the trust purposes must yield in cases of "practical necessity." To apply the public trust doctrine to water bodies, rights and uses never contemplated under the traditional doctrine, extending even to the prevention of any use, is an unprincipled stretching of a doctrine designed to promote use. The newly desired end of environmental protection cannot justify taking such judicial license with an already super-constitutional doctrine. Such a decision is somewhat understandable in the context of California law, where appropriative water rights had been a latecomer and remain subordinate to public navigation and early riparian and other rights.[89] The effect of this decision is to subject virtually all California water rights to review for environmental protection, without addressing constitutional takings protection against curtailment or abrogation of water rights.

Mono Lake may be a unique resource, but this case was not unique; instead, it set off a statewide barrage of litigation. Environmental advocates have laid siege to water rights from virtually every major water body in the state, and California has suddenly leapfrogged Colorado for the uncontested lead in water litigation. Not just Los Angeles, but a wide assortment of municipal, state and agricultural water providers have had their historic water rights threatened, and in many cases curtailed, to satisfy new environmental demands.[90]

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[87] See Natural Soda Products Co. v. City of Los Angeles, 143 P.2d 12 (Cal. 1943); People v. City of Los Angeles, 200 P.2d 122 (Cal. Ct. App. 1949); Natural Soda Products Co. v. City of Los Angeles, 240 P.2d 993 (Cal. Ct. App. 1952).

[88] See 658 P.2d at 713 n.3, 189 Cal. Rptr. at 350 n.3.

[89] See Gould, supra note 5, at 25-43 to 25-47; Hobbs and Raley, supra note 56, at 880-81 (contrasting California's water law with Colorado's). Moreover, for many years before the Mono Lake decision, California had interpreted its "reasonable use" requirement to allow reconsideration and modification of water rights due to changed conditions. Dunning, supra note 57, at 17-42.

[90] See Sax, "The Constitution, Property Rights, and the Future of Water Law," 61 U. Colo. L.Rev. 257, 269-71, (1990); Littleworth, "The Public Trust vs. The Public Interest," 19 Pacific

IV. The New Public Trust Doctrine and its Effects

A. An Environmental Protection Doctrine.

California's public trust doctrine is hardly concerned with navigation or commerce. Navigability may still serve as a pretextual hook on which to hang the justification for a public trust, but today the public trust doctrine is invoked to preserve, protect, or restore natural environments and ecosystems.

These environmental goals are increasingly desirable to the public, but they are public policy goals best resolved by legislation after public debate, considering the most appropriate solution for each resource, with due regard for property rights. Extension of the public trust doctrine, by contrast, is judicial sleight of hand; its rationale (far afield from its roots) is that environmental concerns deserve the same nature and level of protection as public access to water bodies historically used for navigation. Navigational and environmental uses are not cut of the same cloth, however. To put the clothes of navigation, developed over hundreds of years, suddenly onto the body of environmentalism and preservationism, the cause du jour, bypasses property rights and the democratic process.[91]

B. Takings: That Pesky Fifth Amendment.

Federal law does not prevent state governments from condemning water rights to solve environmental problems.[92] Under the Fifth and Fourteenth Amendments of the U.S. Constitution (and typically similar state constitutional provisions[93]), however, just compensation

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[91] "How easy it is to turn a limitation on government power into a justification for expansion. And how utterly unprincipled." "Fish Out of Water" at 567 (quoting Professor Epstein).

[92] In Colorado, C.R.S. § 37-92-102(3)(d) prohibits condemnation for the CWCB minimum streamflow program. This restrictive Colorado statute draws into question whether Colorado may condemn water rights for public trust type preservation purposes.

[93] Colorado's Constitution, in fact, is broader:

> Private property shall not be taken or **damaged**, for public or private use, without just compensation. . . . and until the same shall be paid to the owner, . . .the property shall not be needlessly disturbed, or the proprietary rights of the owner therein divested; and whenever an attempt is made to take private property for a use

must be paid for taking a property right. If California were forced to compensate Los Angeles for taking the city's water, the state would be forced to price and prioritize its environmental values. The public is much more willing to sacrifice others' property rights when taxpayers do not have to pay.

"[I]t is clear that the avoidance of 'takings' problems is a major attraction to those advancing the public trust doctrine. Some advocates of the doctrine are quite frank about this."[94] Where the public trust doctrine has always existed, courts typically have not found a "taking". If a public trust doctrine has always limited a state's water rights, it is harder to complain of lack of just compensation if the state takes those rights away to further trust purposes. Yet even in California, owners must be compensated for facilities and improvements rendered useless by public trust assertions.[95]

In Colorado, however, the doctrine has never before existed. Here, to take water rights and other property by adopting a public trust doctrine would require compensation to those whose rights are taken or damaged.[96] "[T]he government's power to redefine the range of interests included in the ownership of property [is] necessarily constrained by constitutional limits."[97] An owner's property right, for Fifth Amendment purposes, is defined by state law at

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> disturbed, or the proprietary rights of the owner therein divested; and whenever an attempt is made to take private property for a use alleged to be public, the question whether the contemplated use be really public shall be a judicial question, and determined as such without regard to any legislative assertion that the use is public.

Colo. Const., Article II, Section 15. **Takings** require compensation under both the Colorado Constitution and the U.S. Constitution, but **damage** also must be compensated under the Colorado Constitution. This provision requires compensation for damage to water rights. Game and Fish Commission v. Farmers Irrig. Co., 162 Colo. 301, 308-9, 426 P.2d 562 (1967).

[94]Gould, supra note 5 at 25-19.

[95] National Audubon, 658 P.2d at 723 n. 33; City of Berkeley, 162 Cal. Rptr. at 339; see also Gould, supra note 5, at 25-38.

[96] See Summa Corp. v. California, 461 U.S. 198 (1984) (rejecting California's belated assertion of a public trust easement on certain private lands).

[97] Lucas v. South Carolina Coastal Council, 120 L.Ed. 2d 798, 112 S. Ct. 2886, 2892 (U.S. 1992) (explaining Pennsylvania Coal Co. v. Mahon, 260 U.S. 393, 414-15, 43 S. Ct. 158, 160 (1922)).

economically beneficial use of a property right are compensable takings.[98] This is true whether the limitations are imposed by legislation, administrative action, constitutional amendment, or judicial decision.[99]

Colorado has rejected the public trust doctrine as inconsistent with rights of appropriation under the state constitution. Unlike California law, which has long recognized both riparian rights (as superior to appropriative rights) and public trust constraints, past and present Colorado law provides no basis for subjecting water rights to public trust purposes. Colorado water rights are vested property rights, fully protected by the constitutional guaranties against takings without compensation.[100] To impose a public trust on existing water rights at this late date, even by constitutional amendment, would require compensation.

V. The Public Trust Ballot Initiative.

Richard Hamilton and Jerry Swingle have proposed a statewide ballot initiative with many features; first and foremost, it would require Colorado to "adopt and defend a strong public trust doctrine regarding the publics' rights and ownerships in and of the waters in Colorado."[101] While the "strong public trust doctrine" is not defined in the measure, the proponents have not been shy in explaining what they think it means. Earlier this month, the Colorado Supreme Court declined to adopt the proponents' interpretation of the meaning of this phrase, holding that "any intent of the proponents not adequately expressed in the language of the measure will not govern [court's] construction . . . . The phrase 'strong public trust doctrine,' therefore, does not necessarily carry the specialized meaning propounded by the proponents."[102] Thus, if the initiative is adopted, it will remain for the courts to sort out its meaning.

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[98] Lucas, 112 S. Ct. at 2900.

[99] See B. Thompson, "Judicial Takings," 76 Va. L.Rev. 1449 (1990).

[100] Farmers Irrig. Co. v. Game and Fish Commission, 149 Colo. 313, 323, 269 P.2d 557, 559-60 (1962).

[101] The proponents introduced this measure as the "Give the Vote on Water" initiative. However, it really would empower not the voters, but the courts, lawyers, and state agencies at the expense of private owners.

[102] In the Matter of the Title, Ballot Title, Submission Clause and Summary Adopted April 6, 1994, by the Title Board Pertaining to a Proposed Initiative on Water Rights, Case No. 94SA149, Colo. Sup. Ct., July 5, 1994 ("In re: Water Rights Initiative"), Slip Op. at 11.

What is a "strong public trust doctrine"? The proponents suggest it goes at least as far as California's doctrine, relying especially on the Marks v. Whitney, City of Berkeley, and Mono Lake cases discussed above.[103] The California cases suggest the doctrine is limited to protection of navigable waterways, which may extend to restricting diversions from their nonnavigable tributaries. Nothing in the initiative, however, expressly changes Colorado's recognition that it has no navigable streams. What, then, does the initiative protect? It does say that "Colorado adopt and defend a strong public trust doctrine regarding the public's rights and ownership in and of the waters in Colorado." If it does not extend beyond navigable waters, it may be virtually meaningless; but if it extends to all the waters in Colorado, it would be the most radical extension of the public trust doctrine yet, severing the doctrine completely from its historic anchor of navigability. This would revolutionize water rights in Colorado, more than anything in over 130 years.

At the very least, this initiative (if passed) will dramatically increase litigation over Colorado water rights. The proponents intend it to apply not only in determinations of new water rights, but also to force reconsideration of rights previously decreed, as in the Mono Lake case.[104] Because the central phrase, "strong public trust doctrine," is undefined, "its meaning and content can only be determined through years of lawsuits."[105] In essence, the initiative would grant enormous power over water rights to the judiciary, with hardly any standards constraining that power. Such raw judicial power undercuts not only property rights, but also the basic principles of democratic government.[106] Moreover, the prospect of such broad-based, standardless litigation destroys the fundamental certainty provided by property rights in general, and prior appropriation in particular.[107]

Owners and users of all water diverted and stored in Colorado would be at risk. All diversion and storage projects are planned, financed, and completed based on assumptions the priority system applies, and that a certain volume of water can be diverted or stored whenever available in priority. A public trust, however, would render all these rights subject to potential curtailment or revocation--not just by water shortage, senior rights or non-use, but by the state's or a judge's subjective determination that one use has become more valuable than another. This

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[103] See Answering Brief of Respondent Richard G. Hamilton, pro se, filed May 23, 1994 with the Colorado Supreme Court in Case No. 94 SA 149 ("Hamilton Brief"), at 6-10.

[104] Id.

[105] Gould, supra note 5, at 25-45.

[106] See "Fish Out of Water," supra, at 554, 566.

[107] Gould, supra note 5, at 25-45 and -46.

intolerable level of uncertainty could make it virtually impossible to plan or finance a significant water project, and might jeopardize the financing of many projects which have been built but not yet paid off.

The second clause of the Initiative would require the State to "protect and defend the publics' interests in waters **from unwarranted or otherwise narrow definitions of its waters as private property.**" Mr. Hamilton says this is "to insist that our public waters never be defined as private property."[108] If thus interpreted, this provision would fly in the face of the longstanding Colorado principle that appropriation creates a "most valuable property right" in the exclusive use of water,[109] requiring the State to defend **against** the very rights it has always approved and defended. This provision also requires the state to act against private owners, contrary to the traditional public trust doctrine which restrained the state's powers.

Like other modern advocates of the public trust doctrine, Mr. Hamilton[110] seeks to use the Initiative to enable state-required transfers of private rights to public use, without the owners' consent and without compensation. Mr. Hamilton said to the Legislative Council:

> Do the proponents intend that the courts, in upholding a "public trust doctrine," will have the authority to transfer existing privately held rights to the public? And the answer is that yes, we do.

To the next question, "Without the consent of the individuals who may have the right to use that water at the moment?", Mr. Hamilton answered, "Yeah."[111] Mr. Hamilton went on to describe California's City of Berkeley decision, saying these forced transfers of private rights to the public would be without compensation.[112]

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[108] See Hamilton Brief, supra note 103, at 2.

[109] Navajo Development Co., 655 P.2d at 1377-78; Farmers Irrig. Co., 269 P.2d at 559-60; Nichols v. McIntosh, 34 P. at 280.

[110] Mr. Swingle, by contrast, has disavowed such an intent, implying that questions of compensation would be for the courts to determine. Reporter's Transcript of Hearing on Motion for Rehearing, April 6, 1994 ("Rehearing Tr."), at 16, 20-21. This would further increase litigation over the initiative, and could place enormous demands on the State's budget if takings claims were upheld.

[111] Transcript of Initiative Comments Hearing held Feb. 25, 1994 at 42-44.

[112] Id. at 46; see also In re: Water Rights Initiative, Slip Op. at 14.

However, not even an amendment to Colorado's constitution can take, without compensation, property rights protected by the U.S. Constitution. A newly adopted state constitutional provision "cannot be the basis for asserting that a public right has existed since statehood."[113] Colorado water rights have always been recognized as property rights, have never been limited by a public trust, and cannot be so limited retroactively, absent just compensation. Thus, the transfers contemplated by Mr. Hamilton would subject the State to enormous liability for takings.

The proponents have claimed their "strong public trust doctrine" would not supplant the appropriation doctrine, but would establish a new, conjunctive and coequal doctrine in Colorado water law. They cite the Mono Lake decision and subsequent California cases as illustrating such a dual system.[114] The effects of these cases, however, disprove the notion that a coequal public trust doctrine would not harm appropriative rights.

The final section of the Initiative[115] provides for public ownership, through the Colorado Water Conservation Board ("CWCB"), of waters dedicated to instream or in-lake uses. Any "ownership in the rights of use of waters" could be decreed to such public use, and the CWCB would be required to accept, protect and defend such dedications "as an element" of the public trust.

This section would greatly alter the CWCB's "instream flow" (ISF) program, which protects instream uses and natural lake levels, within the confines of the appropriation system.[116] The CWCB may appropriate new water rights for instream flow, and may acquire

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[113] "Fish Out of Water" at 547.

[114] Rehearing Tr. at 14-15 (testimony of Mr. Swingle); Proponents' Monograph, "The Public Trust Doctrine," (submitted in proceedings before the Legislative Council and the Title Board) at 7.

[115] The Initiative also contains provisions which would substantially alter the law governing water conservancy districts. These provisions are similar to proposals which have been attempted, debated and ultimately withdrawn or defeated in the past, both in legislation and in ballot initiatives, and are beyond the scope of this paper.

[116] See Colo. River Water Conservation Dist. v. CWCB, 197 Colo. 469, 594 P.2d 570, 577 (1979); CWCB Rules and Regulations for the Colorado Instream Flow and Natural Lake Level Program, 2 CCR 408-2 (Dec. 1993); Sims, "Colorado's Instream Flow Program: Integrating Instream Flow Protection Into a Prior Appropriation System," Instream Flow Protection in the West (U. Colo. Natural Resources Law Center, Rev. Ed. 1993); Shupe, "Colorado's Instream Flow Program: Protecting Free-Flowing Streams in a Water-Consumptive State," Instream Flow Protection in the West 237 (U. Colo. Nat. Res. L. Center, 1989)

existing senior rights to convert their historic use to instream flow.[117] Such use by the CWCB is deemed "beneficial use," to the extent it is "required to preserve the natural environment to a reasonable degree."[118] Because the CWCB is also charged with promoting use of the water to which Colorado is entitled by interstate compacts and apportionments, it is ideally suited to determine how much instream flow is required and reasonable, in light of the other uses precluded thereby.

The proposed initiative would upset the careful, and widely approved, balance the legislature and CWCB have struck between instream and other beneficial uses of water. While the initiative is ambiguous, it could be interpreted to allow a decree to the public "dedicated to the benefit of any stream," without consideration of future human uses precluded by such a dedication. It could lead to preservation of most or all the unappropriated flow of the Colorado River, precluding any junior uses of this resource which is so vital to western Colorado. Similarly, a "dedication" of the Arkansas River, where new junior rights are already precluded by overappropriation, could block the plans for augmentation and exchange which will be crucial to preserving Colorado's agricultural and well economy against the demands of Kansas in interstate compact litigation. The CWCB's administration of the ISF program under its current statutory authority has served Colorado well. Here, as with the more general provisions of the initiative, the proposed "public trust" could well be fatal to Colorado's water future.

Moreover, the cost of these provisions would be enormous. The CWCB has estimated it would need to spend an additional $750,000 to $16,600,000 for litigation and administrative requirements imposed by the initiative.[119] In addition, local governments (cities, towns and districts) own many or most of the water rights impacted by the initiative, and would also face huge litigation expenses.[120] In these days of Amendment One and other constraints on government spending, surely there are better uses for scarce public funds.

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[117] C.R.S. §37-92-102(3).

[118] C.R.S. §37-92-103(4).

[119] Letter of March 15, 1994, from Daries C. Lile, Director, CWCB, to Ronald W. Cattany, Deputy Director, Colorado Department of Natural Resources.

[120] See Title Board's fiscal impact statement (quoted in In re: Water Rights Initiative, Slip Op. at 7).

CONCLUSION

Colorado's appropriation doctrine has met the State's water needs for over 100 years. As new needs and values have arisen, they have been addressed within that system by such adaptations as the ISF program and revegetation requirements for transfers from agricultural use. No one can say with certainty what a "strong public trust doctrine" would mean in Colorado. However, it undoubtedly would require massive and endless litigation, both to determine the meaning of the initiative, and to comply with its express requirements. The initiative's hostility to private property is unwarranted, and would carry great costs. To the extent reallocation of water to new uses is desired, Colorado's existing laws and market forces can achieve the goal while assuring no one's rights are taken or damaged without compensation. Unlike property rights and market forces, the public trust "trump card" takes away the incentive for private owners to conserve or wisely manage their property, putting the entire burden on the state.

Colorado's water problems typically have been addressed through discussions among concerned parties, and in many ways, those discussions are more fruitful now than ever before. The deadly weapon of a "strong public trust doctrine" would immediately shift these discussions into the courtroom, replacing collaborative problem-solving with destructive legal warfare.

Q: (Unknown) Steve, I appreciate the opportunity for deja vu. When I was in law school in 1978, in Washington State, I attempted to apply the Public Trust Doctrine in the Illinois Central case to an issue on the Columbia River, taking Mr. Swingle's side of that argument. I have since come to realize that in my mind, it doesn't apply. As a lawyer, I believe that you win the argument on the concept that the Public Trust Doctrine is not applicable in Colorado for the situation we are dealing with. But we need to go beyond that and get to the point that Jerry raises about the public value, and that the public values need to be factored into the equation when you value water rights or the use of water. I think you said that the urban economics have skewed the concept of the value of water simply to its value for development. A few years ago, I heard Chris Paulson make the statement, "I am an environmentalist until it costs me something." Think about that one. You raised the issue of cost. That's what I would like to hear you both address for all of us. If you're going to bring those values in, and I think they need to be brought into the equation, how do you value them? More importantly, how do you bring the cost to the table in the form of real dollars? That, unfortunately, is what makes the world go 'round. I sat here this morning and listened to Lee talk about the kind of time that federal agencies, the City of Greeley, and other Front Range cities have put into the mitigation issues for endangered species. His chart showed me that the mitigation cost was $15,000 per year for that tiny quantity of water that was impacting this endangered species. I wonder how many millions of dollars in man hours and taxpayer dollars were spent coming to that conclusion. We have some economic issues that are totally out of whack, and I think that's where we need to move this debate. Yes, let us value those values, let's get them to the table, and let's deal with them within the given confines of the Appropriation Doctrine, and the economic analysis that we need to.

A: (Swingle) I'd like to offer that we might want to ask a different subset of citizens in Colorado to place a value on environmental concern. I am going to suggest to all of those people who live in the immediate vicinity and also somewhat further away from Rocky Flats that I would like to pose a question to them, to the state government, to EPA, and to the Superfund folks (which is us; I mean it is our money). Let's place a value on the economic oversights that occurred in the development and operation of Rocky Flats. Let's say we didn't, in fact, take an appropriate perspective with regard to the environment. What is the cost after the fact? That may be a more important question than asking about the value of one endangered species. Some while back, someone had invited me to be on a panel to discuss, among other things, the value of a squaw fish. Real interesting question. I don't know what they taste like, and I certainly don't want to subject myself to whatever the federal charge might be these days for catching and eating one. I shifted the discussion a little bit and said, "Let's talk about the value of a canary." The problem was everyone said, "Excuse me, a canary?" The answer was at Woolworth's $1.79, maybe $2.50, whatever they are running these days. If you run a canary farm it is a little different. I said, "Let's go back a hundred years. Let's put ourselves in a town, somewhere in Eastern Pennsylvania or preferably somewhere in Europe or Great Britain perhaps. You're in a town, there has been a blight if you will, a disease has struck, and it has wiped out every canary for hundreds of miles around except for one that sits in one fellow's house in a cage. The only two realities that you know are first, that there is only one canary left within a few hundred miles, and second, the next morning, in order earn a living, you have to go down into a mine. The only way you had a hundred years ago to know whether you would walk back out of that mine or not was to have a canary with you to monitor. We refer to them in more sophisticated terms today; we refer to them as indicator species, but that's an analogy. At that point I want to ask you if all of the miners got together and this fellow said, "Well, I was thinking of having him for dinner," or He's a really great pet, and I really don't want to let him go," what value would then be placed on that one creature, on that one canary? I maintain that we need to take a broader perspective. We need to take a look at the possibility that endangered species are in fact not just disappearing coincidentally, not just disappearing as a result of having arrived at that point in overall evolution where they have gone extinct. They may have a message for us. There may be an underlying message saying, "By the way, the bill on your environmental lack of acuity, on your environmental inattention, on your abuse of the environment is coming due, and guess what? It has an accelerated rate of interest that's being applied cumulatively.

A: (Leonhardt) I agree with Jerry McDaniel's comment. I also agree with much of what Jerry Swingle said on that, particularly with regard to Rocky Flats. The question is not do we need to take public values into account, because clearly we do. In many ways we are doing that already on the state and local level, as well as in some very powerful ways at the federal level. I think that is all very healthy; that's all a part of the system that we have today. Why do we need the Public Trust Doctrine as a very unpredictable weapon to add to that? Do we really want the courts to be answering all these questions for us without any standards or criteria to guide them? Do we really want to devote so much of our resources to litigating these issues for every stream in the state rather than sitting down and working together to solve our problems? On endangered species, we have the very powerful tool of the Endangered Species Act, that as you heard this morning is getting people on these river systems to sit down and talk about how can we not just preserve the habit that is there, but recover these endangered species so that they are not endangered any more. This is all a positive part of what we have right now. We don't need to just throw a wrench into the system.

A: (Swingle) I just need to add that one of the other approaches, of course, is the response that I mentioned, a lot of the water districts funneling money into endangered species reform coalition. I guess I would suggest that that's roughly comparable to the old Greek tradition of let's not deal with the problem, let's just kill the messenger.

Q: (Unknown) I would just like Jerry to answer something that Steve has presented twice now, before we have another question. That is, he obviously feels the Prior Appropriation Doctrine is elastic enough to take into account public values that everyone is expressing. You haven't addressed why that's not true, why we need something else. Can you do that for a moment?

A: (Swingle) I can real briefly. We have a situation with Snowmass Creek that leaves me far less than comfortable, and you can all have your own respective interpretations of that. But I perceive that not as having been a fairly well reasoned, concerted adjustment in how much was required for instream flows. I perceive that as a water grab. That happened under our current system of appropriation. I guess the short answer is no. I see enough problems in the discussions that we have had over the last couple of days, especially around issues of the environment, especially around responding to other needs that are in fact excluded, until some federal law or federal agency steps in to take over with the big club that has been alluded to, to say, "Look, we are either going to make some adjustments to this system, we're going to move some water around for these other interests, or the big club falls." We wouldn't have those threats if we were dealing amongst ourselves with those values and with those issues, so I would say the system is not clearly flexible enough or working effectively right now.

Q: (Unknown) When talking about public values one word has been missing in the recent discussions, and that is that public values change. Is it important, i.e., is it in the public interest, to recognize that change, and how do we do that when our Prior Appropriation system is based on historic practices as opposed to recognizing changing values? As another aspect of this, there is a nuisance to public values when somebody's use of that commodity impairs that resource. Where is the justice when the user says that he's not responsible for restoring that resource to its former value before it was impaired? That question is probably most directed at Steve.

A: (Leonhardt) I think there have been changes in public values, there have been changes in the appropriation system, and the system itself allows for changes in water rights. Just because something is a historic use and is first in time, first in right doesn't mean it is bound in that use forever and ever. We've heard about changes from agricultural to municipal use; we've heard about changes from other beneficial uses to instream use. The system certainly does allow for these kinds of changes. But the changes take place, by and large, in the form of (1) market transactions, where somebody pays fair value for the water right that somebody has developed at great cost; and (2) in the framework of noninjury to other water rights, making sure that when you're moving water up and down the river or imposing a new call that other water rights don't suffer as a result. So I think we have a system that is very flexible, very accommodating of changes, as long as there aren't any big losers as a result of those changes. A big part of my concern with the Public Trust Doctrine is that unless somebody is willing to step up and pay for it they are going to be big losers, and those losers have something that is recognized

as a property right, protected under the Colorado Constitution and defensible under the United States Constitution. You also raised the issue of nuisance. Nuisance was an issue in the U.S. Supreme Court's recent decision on takings in the Lucas case. And the current standard of the U.S. Constitution is that what's a nuisance depends on state law at the time you got your property right. If someone got a water back in 1875, you look and see. Was this diversion for irrigation considered a nuisance at the time that it was entered into in 1875? I think the answer is going to be no. Maybe if public values have changed people would consider it a nuisance now, but if so they need to pay for it.

Q: (Unknown) I have, if I may, a comment and a question primarily directed at the remarks that Jerry made. You made some analogies about the values of species. You were talking about what the value of a squaw fish is, and you turned that discussion to what is the value of a canary. And you talked about what's the value of the environment, protecting it from whatever we were talking about, and turned that to protecting it from Rocky Flats. Unlike a lot of the discussions we have had here over the last couple of days, you, in order to make your point about the value of these things, related them to human utility. You're telling us, let's not ask what is the value of a squawfish. What is the value of a canary? A canary is valuable because it helps people save themselves from a dangerous situation. And let's not talk about the damage to the environment from a water project, lets talk about Rocky Flats, which in fact endangers human health. We've also heard, however, over the last couple of days, a lot of arguments that these things are worth preserving and protecting for their own sake, which is a little bit different. In fact, it sounds to me like those kinds of comments are more in line with the thinking of the people who are on the other side of the issue than you are. While I have heard a lot of things suggested about reasons why we should protect the squaw fish, utility to humans has not been one of them, at any time. That's my comment. My question is one of specific effects of the Public Trust initiative. Could you try to illustrate for us what you think will be different if the Public trust initiative is adopted as you have proposed it? Let me give you a couple of situations, if I can, to illustrate that. What do you think will be different about trying, for example, to build or obtain a new water right for a new project? What do you think will be different as a result of adoption of this for operation of existing water rights and projects? What do you think might be different about some of the processes that Steve talked about, of changing water rights from existing uses to new uses?

A: (Swingle) Probably one of the clearest examples might be the Snowmass Creek situation that I alluded to, and again that's neither a new project, nor if you will, some serious modification of an existing project. What I envision is the Public Trust Doctrine being applied through the court system and providing a clear legal basis, and a clear venue, for people representing other values and other interests, providing those values and interests with a forum so that the discussion will be broadened out to something beyond can we certify this to be a beneficial use, will it in fact injure another existing beneficial use? That's basically the locus of the argument. It will enable other people who perceive other public interests or public values to come to the table, to say as the court or as the judge apportioning this water or authorizing this project, you need to consider the following. You need to involve these in your decision making. It really is the process that was alluded to earlier that most of the federal agencies are involved in. What they do is scoping. They do EISes, or EAs, and they say overall, since we're dealing with a public value here we need to know what all these implications are. We need to take them into consideration. It is not a matter of is A or B the more justified in their claim to this particular resource. So what I see it doing is basically offering the opportunity to have those values expressed and considered and in some sense opening the process, I would assume before hand to avoid litigation, to get stake holders to the table, to say what the vested public interests are here. What are the vested public values that need to be considered in making this decision? And with regard to the value of the environment, I would just like to clarify that what I was responding to were very pragmatic questions about the value of the environment. Do I think that the environment has a value in and of itself? I think it's reality. I think it's where we live, breathe and act, and live out our lives. For us to pretend that we are separate from, independent of, or necessarily superior to, in some sense, that we can dictate how that environment lives, survives, struggles along, or whatever is presumptuous. It may be the best case example of hubris that I know.

Q: (Unknown) Perhaps the most important part of my question has been buried in the middle. Do you see, if this Public Trust initiative is adopted, the opening up of the discussion process being applied to

existing projects as Steve tells us is happening in California?

A: (Swingle) I think it probably will at some point, yes. If there are sufficient negative impacts or negative implications of the projects as they are currently operated -- you know, throughout Glen Canyon is the prime example with the Lower Colorado WAPA system. As new knowledge comes to the fore, as we become aware of damage that we have done either inadvertently or in fact intentionally to the environment that has long-term serious implications, we would be insane to participate in and continue to live with a system that didn't recognize those impacts.

A: (Leonhardt) To respond briefly to Jerry's last point, first of all Mr. Swingle, as usual, is much more diplomatic than his cosponsor, Mr. Hamilton. Mr. Hamilton has said that he intends that this initiative be applied to take private rights and transfer those to public uses without the consent of the owners, and that he thinks that under a Public Trust Doctrine that would take away a necessity for the state to pay compensation for that. On Snow Mass Creek, if Colorado didn't have an instream flow program there wouldn't be a Snow Mass Creek Case. California did not have an instream flow program, and a lot people think that is why the California Supreme Court felt it was necessary to take the drastic step that they did in the Mono Lake Case. Maybe part of the discussion here is the merits of the instream flow program, but who's to say whether the result would be any different under a Public Trust Doctrine? The public values -- people did have a full opportunity to present their case to the Colorado Water Conservation Board, the Denver District Court, the Colorado Supreme Court, and under the instream flow program those values are taken into account. Maybe we should be talking about specific steps and specific cases, rather than this loose machine gun.

Q: (Unknown) This gentleman made a comment that it is getting expensive to mitigate projects, $15,000 and such. Mitigation is the cost of doing business, and if it is too expensive perhaps the project shouldn't happen. You mentioned losers -- there are going to be some big losers in Public Trust. Well, I lose every day that a river is dried up. It grieves me seriously, it hurts our ecosystem, and I feel I am losing all the time because of the environmental degradation that has happened in the past. That is a situation that I want to rectify. I think that's what public values are all about, or at least partially about, correcting these past injustices. The question I have for you, Mr. Leonhardt, is what's your alternative? Your testimony was, the stream went dry. Streams do go dry, and the instream flow program does not stop that. It has junior water rights. You also said that we don't have the money to buy out these water rights because of amendment one or whatever. You know, we formed land trusts to try to raise this money privately. I fully believe in that, but there's not enough money there. So I want to ask what's the alternative?

A: (Leonhardt) The Colorado Water Conservation Board is authorized to buy senior water rights. Under amendment eight the state does have a whole new source of money that the Supreme Court has held is exempt from amendment one. It is going to be dedicated to environmental uses, and I think that is an appropriate source of money to start rectifying these problems and playing this out in the market. I think maybe the movie we are talking about here isn't Field of Dreams but Back to the Future. We can't rewrite the entire history of the state. Bringing in the Public Trust Doctrine at this point is the wrong answer to the wrong question. Even if all of us agree that the goal is really to accommodate both man's needs and nature's needs, the questions to ask are: (1) how do we get there, not going back 130 years but from here; (2) how far should we go; (3) who's going to pay for it; and (4) aren't we getting there already? That is how I see this playing out, and I think the Public Trust Doctrine is the wrong answer because of all the uncertainty that it would throw into the system. It answers nothing; it only raises questions.

Q: (Unknown) One of things that I have observed as a Coloradan, and that I think is one of the big problems here, is the unwillingness of institutions to change. Those who are in power and who have their hands on the levers don't like to offer power, or partnership in power, to other people. In terms of Colorado's decision making process and it's water law, it has been extremely successful in resisting change. I think that the system we have had, all agree, has many good points, and no one wants to throw the whole thing out. At the same time, the system worked adequately when we did not have so much growth and ever-increasing demands on the water supply. In other words, whatever the system

was, whether you and I had any standing in court, whether our interests could be asserted adequately or taken into consideration, didn't matter as much in a time through most of our history, when there was enough water that for the most part, we were not seeing streams being brought to extinction and other dire problems. Now we know we've got a resource that can hardly stretch and make it. Therefore, change is going to have to be accommodated. As long as, for example, we have an economy that is based on recreational tourism, there really are no components in our state system to accommodate that. We used to say water flows uphill to money. Believe me, in Western Colorado it inevitably will flow to money, and that means it's going to flow downstream the way Mother Nature intended it. It isn't just because there are some folks who call themselves environmentalists or because deep within some part of ourselves we know that we live in these beautiful places because they have meaning and we could not do without these vistas and canyons and free-flowing waters. Finally, it means every mom and pop on every main street in most of these little counties is gradually waking up to the fact that all of those businesses upon which we are dependent are gone -- zero, zip, out of business. We have no economy, we have no communities, we have no counties, unless you protect water uses that sustain all of those small business which are reliant on recreational tourism. So, finally all of this will change. It is not right that mom and pop and the third party effects on them are not considered in the water court. And they are not. They have no standing. How can we be citizens of this state and say it's okay for some folks to have no standings? It is not all right. My family has made its productive life in this county; your families have -- we count, and all the people like us. There has to be some factor that is brought into state law to accommodate these matters. We have to believe as Coloradans that we can do it. Nevertheless, we have to assert against those who simply always want to maintain the status quo because it benefits only their pocket, and they do not want to consider you and I. So, we just have to move forward with this. Colorado will make it happen, sooner or later, I believe.

(Comment by Ruth Hutchins) Water is now running in the Owens River for the first time since Los Angeles took it out at the turn of the century. The first fish have been stocked. Mr. Leonhardt, when I brought this to his attention said, "I was told that it was so dry it could never be reconstituted."

List of Participants

John Alkot
General Counsel
Farmers Res & Irrig Co
80 S 27th Ave
Brighton, CO 80601
(303) 659-7373

Cap Allen
Cap Allen Engineering
5 River Bend
Durango CO 81301
(303) 259-6241

Jon Altenhofen
North Colo Water Conserv Dist
PO Box 679
Loveland CO 80539
(303) 667-2437

Laura Anderson
Chronicle & Pilot
PO Box 369
Crested Butte CO 81224
(303) 349-6114

Lawrence Aubert
General Manager
Ute Water Conserv Dist
PO Box 460
Grand Junction CO 81502
(303) 242-7491

Mike Baker
Planning Team Leader
Bureau of Reclamation
PO Box 60340
Grand Junction CO 81506
(303) 248-0637

Tom Bargensten
Reclamation/Soils Specialist
Bureau of Land Management
2815 H Road
Grand Junction CO 81506
(303) 244-3000

Soraya Baramound
2230 Skyview Ln, Apt 150
Colorado Springs CO 80904
(417) 473-2210

William Bates
Water Resource Engineer
Denver Water Department
1600 W 12th Ave
Denver CO 80254
(303) 628-6547

Shirley Baty
LaPlata County Government
1060 E Second Ave
Durango CO 81301
(303) 382-6219

David Baumgarten
Gunnison County
200 W Virginia
Gunnison, CO 81230
(303) 641-5300

Ken Beck
Bureau of Reclamation
PO Box 640
Durango CO 81302
(303) 385-6558

Ken Beegles
Acting Division VII Engineer
Colorado Division of Water Resources
PO Drawer 1880
Durango CO 81301
(303) 247-1845

Orlyn Bell
Division V Engineer
Division of Water Resources
PO Box 396
Glenwood Springs CO 81602
(303) 945-5665

Janet Bellis
Groundwater Specialists
4730 Table Mesa, Ste I-34
Boulder CO 80303

Mike Berry
Tri-County Water Conserv District
PO Box 347
Montrose CO 81402
(303) 249-3369

Barbara Biggs
Metro Wastewater Reclamation Dist
6450 York St
Denver CO 80229
(303) 286-3464

Peter Binney
CH2M Hill
PO Box 22508
Denver CO 80222
(303) 771-0900

Joe Blake
Douglas County Water Res Auth
101 3rd St
Castle Rock CO 80401
(303) 660-7400

Edward Blank
Division VI Engineer
Division of Water Resources
PO Box 3450
Steamboat Springs CO 80477
(303) 879-0272

Steve Boand
1309 Ridge Trail Dr
Castle Rock CO 80104
(303) 688-8386

William Bohlender
President
No Colo Water Conserv Dist
PO Box 679
Loveland CO 80539
(303) 667-2437

Jean Bolton
Larimer League of Women Voters
808 Buckeye St
Ft Collins CO 80524

Gary Bostrom
City of Colorado Springs Water Dept
PO Box 1100 MC #630
Colorado Springs CO 80947
(719) 636-5681

Carol Bradley
Gannett News Service
100 Wilson Blvd
Arlington VA 22229
(703) 276-5253

Chris Bridges
Office of Water Conservation
Colorado Water Conserv Board
1313 Sherman Street Rm 721
Denver CO 80203
(303) 866-3441

Ray Bullock
Douglas County Water Res Auth
101 3rd St
Castle Rock CO 80401
(303) 660-7400

Will Burt
Division of Water Resources
1313 Sherman St, Rm 818
Denver, CO 80203
(303) 866-3585

Lyle Bush
Coors Brewing Company
Water Resources
Mail #CC370
Golden CO 80401
(303) 277-6746

Ralph Canaday
Regional Solicitor
Department of Interior
PO Box 25007 D-105 DFC
Denver CO 80225
(303) 236-8460

Grant Cardon
Department of Soil & Crop Sciences
Colorado State University
Fort Collins CO 80523
(303) 491-6235

Lee Carlson
Colo Field Supervisor
US Fish & Wildlife Service
PO Box 25486 DFC
Denver CO 80225
(303) 236-7950

Dave Carter
Rocky Mountain Farmers Union
10800 E Bethany Dr
Aurora CO 80014
(303) 752-5800

Tim Casey
Mountain Marketing
PO Box 2340
Breckenridge CO 80424
(303) 453-2571

John Chapman
Superintendent
Curecanti National Recreation Area
102 Elk Creek
Gunnison CO 81230
(303) 641-2337

Don Christiansen
General Manager
Central Utah Conserv Dist
355 West 1300 South
Orem UT 84058
(801) 226-7100

Jeff Clark
Centennial Water and San Dist
62 W Plaza Dr
Highlands Ranch CO 80126

Ralph Clark III
519 Gerogia Ave
Gunnison CO 81230
(303) 641-2907

Arron Clay
Division IV Water Referee
PO Box 368
Montrose CO 81402
(303) 249-2859

Orris Collins
Director
St Charles Mesa Water Dist
1397 South Aspen
Pueblo CO 81006
(719) 542-4380

Commisisoners
Gunnison County
200 E Virginia Ave
Gunnison CO 81230
(303) 641-0850

Daniel Crabtree
US Bureau of Reclamation
2764 Compass Drive
PO Box 60340
Grand Junciton CO 81506
(303) 248-0652

Mike Crosby
Colo Div of Wildlife
PO Box 339
Parshall CO 80468
(303) 725-3627

Lurline Curran
Director of Planning
Grand County Planning Dept
Courthouse
Hot Sulphur Springs CO 80541-0239
(303) 725-3347

Ken Czaranowski
National Park Service
2180 Blue Spruce Dr
Estes Park CO 80517
(303) 356-1263

Alice Darilck
New Mexico State Engineer Office
PO Box 25102
Santa Fe NM 87504

Sandra Davis
US General Accounting Office
1244 Speer Blvd Ste 880
Denver CO 80204
(303) 527-7337

Carol DeAngelis
Project Manager
US Bureau of Reclamation
PO Box 60340
Grand Junction CO 81506

William Deoreo
Aquacraft Engineering
3030 15th St
Boulder CO 80304
(303) 786-9691

Frank Dickinson
President
Gunnison County Abstract Co
PO Box 749
Gunnison CO 81230
(303) 641-0710

Larry Dirks
Water Resource Engineer
Denver Water
1600 W 12th Ave
Denver CO 80254
(303) 628-6545

Nancy Driver
Upper Colorado River NAWQA
USGS
DFC PO Box 25046 MS 415
Denver CO 80225
(303) 236-4882

Dennis Ducommun
Grand County W/S District #1
PO Box 3077
Winter Park CO 80492-3077
(303) 726-5583

Steve Dunn
Political Science
Western State College
Gunnison CO 81230
(303) 943-7013

Jim Dyer
Rocky Mountain Institute
1739 Snowmass Creek Rd
Old Snowmass CO 81654
(303) 927-3851

Sandra Eid
Rocky Mountain Chapter
Sierra Club
777 Grant St Ste 606
Denver CO 80203
(303) 861-8819

Evan Ela
Water Resource Department
9500 Civic Dr
Thornton CO 80229
(303) 358-7521

Carol Ellinghouse
City of Boulder
PO Box 791
Boulder CO 80306
(303) 441-3266

Harrison Elote
Jicarilla Apache Tribe
PO Box 313
Dulce NM 87528
(505) 759-3255

Frederick Fendel
Petrock and Fendel
1630 Welton St Ste 200
Denver CO 80202
(303) 543-0702

Bob Filson
City of Gunnison
PO Box 239
Gunnison CO 81230

Dave Fox
Colo Div of Water Resources
1313 Sherman St Rm 818
Denver CO 80223
(303) 866-3581

Jim Fritze
Eagle County
PO Box 850
Eagle CO 81631
(303) 328-8685

Toby Gadd
Grand Junction CO

Mark Gage
Denver Water
1600 W 12th Ave
Denver CO 80254
(303) 628-6523

William Gilbert
52 Cove Rd
Gunnison CO 81230

Steve Glazer
High Country Citizen's Alliance
PO Box 459
Crested Butte CO 81224
(303) 349-6646

Craig Glogowski
Senator Hank Brown
Fed Bldg Rm 215 400 Rood
Grand Junction CO 81501
(303) 245-9553

Ron Gosnell
Colo State Forest Service
936 Lefthand Canyon Dr
Boulder CO 80302
(303) 442-0428

Nancy Grief
Southwestern Water Conserv Dist
835 E 2nd Ave
Durango CO 81301
(303) 247-1755

Lloyd Gronning
President
Gronning Engineering Company
1333 W 120th Ave Ste 314
Denver CO 80234
(303) 450-0100

Michael Gross
Hydrologist
Colorado River Water Cons Dist
PO Box 1120
Glenwood Springs CO 81602
(303) 945-8522

Richard Gustafson
225 Wall Street
Vail CO 81657
(303) 476-3276

Walid Hajj
Spronk Water Engineers
90 Madison St
Denver CO 80206

Dorothy Hamilton
Larimer Co League of Women Voters
808 Buckeye St
Ft Collins CO 80521

Steve Harris
Southwestern Water Conserv Dist
PO Box 475
Durango CO 81302
(303) 247-1302

Steve Harrison
Florence Water Superintendent
300 W Main
Florence CO 81226
(719) 784-4848

Jonathan Hays
District Judge
19th Judicial District
PO Box C
Greeley CO 80632
(303) 351-7300

Lucy High
Director
Colorado Water Workshop
Western State College
Gunnison CO 81231
(303) 943-7156

Jack Holmes
1219 Gold Park Rd
Red Cliff CO 81649
(303) 827-5207

Peter Holton
LaPlata Planning Dept
1060 E 2nd Ave
Durango CO 81301
(303) 382-6267

Linda Hopkins
Hydrologic Tech
Bureau of Reclamation, ECAO
11056 W CR 18E
Loveland CO 80537-9711
(303) 667-4410

Dorothy Hoskin
Ute Water Conserv Dist
PO Box 460
Grand Junction CO 81502
(303) 242-7491

Gregory Hoskin
Nelson, Hoskin, & Farina
PO Box 40
Grand Junction CO 81502
(303) 242-4903

Richard Howard
Lindhal Associates
PO Box 2100
Eagle CO 81631
(303) 328-7050

Marcia Hughes
Union Blvd Ste 415
Lakewood CO 80228-1556
(303) 980-8668

Stephen Hughes
US Bureau of Reclamation
PO Box 25007 MS 5752
Denver CO 80225
(303) 236-0195

Rick Hum
Summit County Commissioner
po Box 38
Breckenridge CO 80424
(303) 453-2561

Scott Hummer
Colo Div of Water Resources
PO Box 4741
Breckenridge CO 80424

Ruth Hutdhins
Secretary
Mesa County Water Assn
1574 L Road
Fruita CO 81521
(303) 858-7363

Dee Jacobson
Senator Ben Campbell
743 Horizon Ct
Grand Junction CO 81501
(303) 241-6631

Nancy Jacques
Colorado Rivers Alliance
PO Box 4054
Durango Co 81302
(303) 259-3209

Frank Jeager
Parker Water & San Dist
PO Drawer 700
Parker CO 80134
(303) 841-4621

Steve Jamieson
GEI Consultants Inc
5660 Greenwood Plaza Blvd 202
Englewood CO 80111
(303) 779-5565

Steven Jeffers
Grant Bernard Lyons & Gaddis
515 Kimbark St
Longmont CO 80502
(303) 776-9900

Douglas Kemper
City of Aurora
1470 S Havana
Aurora CO 80012

Jerry Kenny
Boyle Engineering Corp
165 S Union Ste 200
Lakewood CO 80228
(303) 987-3443

Ken Knox
Division Engineer
Colo Div of Water Resources
PO Box 456
Montrose CO 81401
(303) 249-6622

Kark Koleber
City of Thornton
Office of Water Resources
9500 Civic Center Drive
Thornton CO 80229
(303) 538-7381

Dale Kralicek
City of Northglenn
11701 Community Center Dr
Nrothglenn CO 80223

Bob Kretschman
Greeley Tribune
2918 State Farm Rd 3
Evans CO 80620
(303) 352-0211

Fred V. Kroeger
SW Colo Water Conserv Dist
PO Box 475
Durango CO 81302

Rod Kuharich
Utility Planning Coordinator
Colorado Springs Utilities
PO Box 1103
Colorado Springs CO 80947
(719) 636-5300

Paul Lander
Water Conservation
City of Boulder
PO Box 791
Boulder CO 80306
(303) 441-4081

Steve Lautenschlager
Colo Div of Water Resources
1313 Sherman St Ste 818
Denver CO 80203
(303) 866-3581

Stephen Leonhardt
Fairfield and Woods
1700 Lincoln St Ste 2400
Denver CO 80203
(303) 830-2400

Sally Lewis
Colo Div of Water Resources
PO Box 3450
Stemboat Springs CO 80477
(303) 879-0272

Chuch Lile
Director
CWCB
1313 Sherman St Rm 721
Denver CO 80203
(303) 866-3441

Bill Linnane
Town of Estes Park
PO Box 1200
Estes Park CO 80517
(303) 586-5331

Chips Barry
Denver Water Dept
1600 W 12th Ave
Denver CO 80254
(303) 628-6533

Susan Lohr
UGRWCD
PO Box 1757
Crested Butte CO 81224
(303) 349-7231

Heather MacGregor
Grand Junction Daily Sentinel
PO Box 668
Grand Junction CO 81502
(303) 945-7439

Teresa Mariner
Ute Water
PO Box 460
Grand Junction CO 81502

Tyler Martineau
Manager
Upper Gunnison Water Conserv Dist
275 S Spruce St
Gunnison CO 81230
(303) 641-6065

Gerry McDaniel
McDaniel McDaniel Baty-Nicholson
PO Box 1157
Durango Co 81302-1157
(303) 247-1113

Mike McGuire
Bureau of Land Management
2815 H Road
Grand Junction CO 81506
(303) 244-3075

Munir Meghjee
Sierra Club Legal Defense Fund
1631 Glenarm Pl #300
Denver CO 80202
(303) 623-9466

Marge Miller
843 Rood Ave
Grand Junction CO 81501
(303) 242-7490

Geroge Mitchel
Assoc Governments of NW Colo
PO Box 351
Rifle CO 81650
(303) 625-1723

Wilbert Montoya
Jicarilla Apache Tribe
PO Box 313
Dulce NM 87528
(505) 759-3255

David Moore
Water Resource Specialist
Colorado Division of Wildlife
6060 Broadway
Denver Co 80216
(303) 291-7455

Ralph Mullinix
Water Utility Director
City of Loveland
200 N Wilson Ave
Loveland CO 80537
(303) 962-3740

Joe Muniz
Jicarilla Apache Tribe
PO Box 313
Dulce NM 87528
(505) 759-3255

Lynn Murray
Hutchinson Building Corp
13701 Jewell Ave Ste 200
Lakewood CO 80228
(303) 986-6262

Malcolm Murray
Gorsuch Kirgis LLC
1401 17th St Ste 1100
Denver Co 80202
(303) 299-8900

John Nelson
Manager
Norht Marin Water Dist
1709 Al Hambra Ct
Petaluma CA 94954
(415) 897-4133

Perry Olson
Director
Colo Division of Wildlife
6060 N Broadway
Denver CO 80216

Ed Osan
Dir of Policy and Ext Affiars
US Bureau of Reclamation
Interior Building
1849 C St W
Washington DC 20240

Pat Page
Bureau of Reclamation
PO Box 640
Durango CO 81301-0640
(303) 385-6553

E Patterson
SV & LH Water Conserv Dist
1320 Carolina Ave
Longmont CO 80501
(303) 776-0891

Vernon Peppler
President SV & LH
Water Conserv Dist
9595 Nelson Rd Box C #203
Longmont CO 80501
(303) 772-4060

Kenneth Peterson
City of Arvada
PO Box 8101
Arvada CO 80001
(303) 431-3035

Rod Pfannenstiel
Collegiate Broadcast Network
2601 Humbolt St
Denver CO 80210
(303) 722-7344

Cheryl Pilatzke
Evaluator
US General Accounting Office
1244 Speer Blvd Ste 800
Denver CO 80204
(303) 572-7303

Ellen Pinnes
PO Box 2430
Santa Fe NM 87504
(505) 983-9637

Beverly Pinney
Albq Gr - Sierra Club
13117 Bear dAncer Tr NE
ABQ NM 87112
(505) 293-3405

Bob Plaska
Colo Div of Water REsources
PO Box 269
Alamosa CO 81101
(719) 589-6683

Jean Porter
954 Turkey Roost Dr
Livermore CO 80536
(303) 881-3007

Sandra Postel
Professor
Global Dev & Environ Inst
Tufts University
Cabot Building
Medford MA 02155

Kevin Pratt
Attorney
2 N Cascade St Ste 480
Colorado Springs CO 80903-1623
(719) 635-7317

Dale Rademacher
City of Longmont
Longmont CO

Mary Rastall
Denver Water
1600 W 12th Ave
Denver CO 80254

Teresa Rice
Senior Staff Attorney
Natural Resources Law Ctr
CB 401
Boulder CO 80309-0401
(303) 492-1296

Katie Richard
City of Golden
911 10th St
Golden CO 80401
(303) 279-5602

James Richards
2688 Wilshire Ct
Grand Junction CO 81506
(303) 242-8867

Sally Roscoe
Summit Middle School
PO Box 1366
Frisco CO 80443
(303) 453-4027

Keith Routman
770 Utica Ave
Boulder CO 80304
(303) 440-9193

Lee Rozaklis
Vice President
Hydrosphere
10202 Walnut St Ste 200
Boulder CO 80302
(303) 443-7839

Ken Salazar
Attorney
Parcel Mauro Hultin & Spaanstra
1801 California St Ste 3600
Denver CO 80202-2636
(303) 298-6400

Philip Saletta
Senior Resource Engineer
City of Colorado Springs
PO Box 1103 MC 630
Colorado Springs CO 80947-0001

Elmo Sandoval
Jicarilla Apache Tribe
PO Box 313
Dulce NM 87528
(505) 759-3255

Kurt Sandoval
Jicarilla Apache Tribe
PO Box 313
Dulce NM 87528
(505) 759-3255

Ann Sanger
Water Resources Department
Colorado Springs Utilities
PO Box 1103 MC 630
Colorado Springs CO 80947
(719) 636-5681

Jim Scheidt
Bureau of Land Management
2815 H Road
Grand Junction CO 81506
(303) 244-3075

Gene Schleiger
Agency Coordinator
Northern Colo Water Cons Dist
1250 Wilson Ave
Loveland CO 80537
(303) 667-2437

John Scott
Northern Colo Water Cons Dist
po Box 679
Lovaland CO 80539

Chris Seldon
Sierra Club Legal Defense Fund
1631 Glanarm Pl #300
Denver CO 80202
(303) 623-9466

Janice Sheftel
Attorney
Maynes Bradford Shipps & Sheftel
PO Box 2717
Durango CO 81302-2717
(303) 247-1755

Hal Simpson
Colo Division of Water Resources
1313 Sherman St Ste 818
Denver CO 80203

Jay Skinner
Colorado Division of Wildlife
6060 Boradway
Denver Co 80216
(303) 291-7260

Steven Snyder
City of Thornton
9500 Civic Center Dr
Thornton CO 80229
(303) 538-7554

Lee Spann
Colo River Water Cons Dist
36781 US Hwy 50
Gunnison CO 81230

Stephen Spann
Shairman
Upper S Platte Water Cons Dist
4801 Galapago St
Englewood CO 80110
(303) 866-3581

Jacque Stafford
Ute Water Cons Dist
PO Box 460
Grand Junction CO 81502
(303) 242-3593

Dick Stenzel
Colo Div of Water Resources
1313 Sherman St Ste 818
Denver CO 80203
(303) 866-3585

Frank Stephens
Dir os Water & Sewer
Greeley
1000 10th St
Greeley CO 80631
(303) 350-9820

Merle Strickland
Councilwoman
City of Florance
300 West Main
Florance CO 81226
(719) 784-4848

Kathy Sturdevant
Pikes Peak Community College
5675 S Academy Blvd
Colorado Springs CO 80906

Rebecca Sudduth
Hydrologic Tech
Bureau of Reclamation, ECAO
11056 W CR 18E
Loveland CO 80537-9711
(303) 667-4410

Jum Sullivan
Commissioner
Douglas County
101 3rd St
Castle Rock Co 80401
(303) 660-7401

Lyle Summers
Utah Dept of Water Resources
Salt Lake City UT 84114

Julie Swanda
Bureau of Reclamation
11056 W CR 18E
Loveland CO 80537-9711
(303) 667-4410

Jerry Swingle
Western Colo Congress
317 E 5th Ave
Durango CO 81301
(303) 247-5797

Rod Tenney
Colo River Water Cons Dist
PO Box 1120
Glenwood Springs CO 81602
(303) 945-8522

Patrice Thomas
Upper Gunnison River WCD
275 Spruce St
Gunnison CO 81230
(303) 641-6065

Larry Todd
Bureau of Reclamation
11056 W CR 18E
Loveland CO 80537-9711
(303) 667-4410

Gregory Trainor
Utility Manager
City of Grand Junction
2514 Snowmass
Grand Junction CO 81503
(303) 244-1564

Chris Treese
Dir of External Affairs
Colo River Water Cons Dist
PO Box 1120
Glenwood Springs CO 81602
(303) 945-8522

Dale Trenda
US Forest Service
2250 Hwy 50
Delta CO 81416
(303) 874-7691

Skip Underwood
Supervisor
Arapaho & Roosevelt Nat Forest
240 W Prospect
Ft Collins CO 80526
(303) 498-1100

James Valliant
CSU Cooperative Extension
PO Box 190
Rocky Ford CO 81067
(719) 254-7609

Steven Vandiver
Division III Engineer
Div of Water Resources
PO Box 269
Alamosa CO 81101
(719) 589-6683

Ken Vaught
Coors Brewing Co
Water Resources
MC #CC370
Golden CO 80402
(303) 277-5595

Thurman Velarde
Jicarilla Apache Tribe
PO Box 313
Dulce NM 87528
(505) 759-3255

Paul Vonguerard
US Geological Survey
Wayne Aspinall Building
402 Rood Ave Rm 223
Grand Junction CO 81501
(303) 245-5257

Mark Waage
Denver Water
1600 W 12th Ave
Denver CO 80254
(303) 628-6572

David Walker
Walker Water Services
5435 S Mohawk Rd
Littleton CO 80123
(303) 794-5696

Lloyd Walker
Chem & Bioresource Eng Dept
Colorado State University
Ft Collins CO 80523
(303) 491-6172

Robert Walker
President
Central Colo Water Cons Dist
4381 County Road U
Wiggins CO 80654
(303) 483-6221

Peter Ware
Town of Carbondale
76 S 2nd St
Carbondale CO 81623

Ed Warner
Bureau of Reclamation
PO Box 60340
Grand Junction CO 81506
(303) 248-0654

George Wear
PO Box 1175
Frisco CO 80443-1175
(303) 668-5589

Robert Weaver
Hydrosphere 1002
Walnut St Ste 200
Boulder CO 80302

John Welch
Superintendant
Black Canyon of the Gunnison
2233 East Main
Montrose CO 81401
(303) 249-7036

Patricia Wells
Denver Water Department
1600 12th Ave
Denver CO 80524
(303) 628-6460

Brian Werner
Northern Colo Water Cons Dist
PO Box 679
Loveland CO 80539
(303) 667-2437

Earline West
Office/Financial Manager
Colo River Water Cons Dist
PO Box 1120
Glenwood Springs CO 81602
(303) 945-8522

Lori West
Bureau of Reclamation
PO Box 60340
Grand Junction CO 81506
(303) 248-0608

Marsha West
Norwood Water Commission
PO Box 528
Norwood CO 81423
(303) 327-4288

Richard Westmore
GEI Consultants Inc
5660 Greenwood Plaza Blvd
Ste 202
Englwood CO 80111
(303) 779-5565

Sandy White
Attorney
White & Jankowski
511 16th St Ste 500
Denver CO 80202
(303) 595-9441

Bruce Whitehead
Colo Div os Water Resources
1313 Sherman St Ste 818
Denver CO 80203
(303) 866-3585

Eric Wilkinson
Manager
Northern Colo Water Cons Dist
PO Box 679
Loveland CO 80539
(303) 667-2437

Les Williams
SV & LH Conserv Dist
9595 Nelson Rd Box C
Ste 203
Longmont CO 80501
(303) 772-4060

Brad Wind
Northern Colo Water Cons Dist
PO Box 679
Loveland CO 80539
(303) 667-2437

Bart Woodward
President
Riverside Irrigation Dist
PO Box 455
Fort Morgan CO 80701
(303) 867-6586

Herman Wooten
Program Manager
Colo Rural Water Assoc
2648 Santa Fe Dr #10
Pueblo CO 81006
(719) 545-6748