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statute does not currently permit water saving without the capability of putting that water to beneficial use in a reasonable amount of time. The courts have interpreted these doctrines to ensure that applicants will be able to actually use the water.

Casey Funk argued that these principles are misplaced and should not apply to government agencies trying to plan for the future of its constituency. Mr. Funk detailed the history of these principles. A few private citizens tried to obtain all the remaining water rights in Colorado. However, they did not have a specific plan of how to use that water, but instead wanted the rights for future investments. The courts would not allow this attempted water purchase because individuals should not obtain water rights while only speculating as to that water's use.

Nevertheless, Mr. Funk argued that a government agency planning for climate change is significantly different from those private citizens. Scientists know that climate change is going to happen and that there will be changes to the water supply, even though these scientists cannot predict the specific changes. Mr. Funk argues that the law should allow Denver Water to account for water reserves to plan for when those changes eventually occur. Courts should give government agencies some deference for strategic planning.

The current law treats government agencies like every other water applicant. Mr. Funk thinks this approach is incorrect. Because governments are inherently different, they should have some ability or leeway to plan for uncertainties. A study of the legislative history of the Anti-Speculation Doctrine shows that the courts were concerned with a monetary speculation scheme, and not government agencies planning for the future needs of their constituencies. Courts should give some deference to the government that must supply water to its citizens.

Shannon L. Carson

WATER LAW AND CLIMATE CHANGE, STRATEGIS FO ADAPTATION AND MITIGATION

Professor A. Dan Tarlock of Chicago-Kent School of Law, Illinois Institute of Technology gave the keynote address at the 2010 University of Denver Water Law Review Symposium. Professor Tarlock discussed the different ways water managers could adapt to the challenges brought on by global climate change.

First, Professor Tarlock discussed that worldwide mitigation to slow the effects of global climate change could take from 100 to 1000 years for the benefits to show. Therefore, Professor Tarlock said adaptation is the key to slow the effects of greenhouse gases.

Earlier in the Symposium, Brad Udall, Director of CU-NOAA, Western Water Assessment, presented the projected climate change impacts on our water supplies. Professor Tarlock agreed with Mr. Udall's conclusions that the change in climate will create both extreme

wet and dry weather events. Overall, the planet will change to a wetter and warmer climate; however, the western United States will change to a drier climate while the eastern states will see more flooding in a wetter climate.

In addition, Professor Tarlock explained that the changes in global climate change would create more competition for water between the various factions of society. This includes rivalries between the water needed for urban areas, versus the water needed for agriculture, fish, and energy production. Moreover, the internal rivalries within various factions will increase, creating competition between different agricultural users or between different urban areas.

Professor Tarlock presented seven options for adaptation to the changing climate. The first option is letting the prior appropriation doctrine work its natural course with a few minor changes. Prior appropriation, a system with built-in risk assignment, calls for junior right holders to bear the burden. Therefore, these junior right holders have fair notice of strict enforcement of priority during times of drought. However, Professor Tarlock noted two problems with prior appropriation. First, water managers expect that courts will rarely apply the prior appropriation doctrine on a big scale. Second, if courts apply prior appropriation on a big scale, junior right holders will "push back." As an example of these problems, Professor Tarlock spotlighted *American Falls Reservoir Dist. v. Idaho Dept. of Water Resources.* In *American Falls*, the Idaho Supreme Court found the application of the prior appropriation doctrine "difficult" and "harsh" during times of drought. The Court avoided the strict enforcement of prior appropriation, instead allowing the state administrative agency to make scientifically informed determinations on delivery of water based on the extant of adverse effect to senior water users.

The prior appropriation changes that Professor Tarlock suggested above include more emphasis on the beneficial use and anti-speculation doctrine. For example, in *Pagosa Springs I and II*, the Colorado Supreme Court held cities can no longer give "faith-based" estimates on the water needed for a particular area, and that global climate change is no longer a justification for bad water planning.

The second option to adapt to the changing climate is letting the markets work. Allowing the market to reallocate water in the most efficient manner will create a greater margin of safety during times of water shortage. Under the two systems, riparian rights and prior appropriation, there are different outcomes. While riparian rights are transferable, the purchaser risks purchasing a questionable right, because the conveyance only binds the grantor and makes no contractual obligations upon the other water users on the source. Under prior appropriation, water rights are transferable, but transaction costs are high. Courts increasingly consider the interests of other right and non-right holders, and sometimes require a review of any environmental concerns before a transfer. Both considerations

increase transaction costs of any water transfer.

The third option is technology-forcing conservation that adapts our water use to climate change. States can use the beneficial use doctrine to implement technology-forcing. California became the first state to mandate efficient water management practices. California requires agricultural water suppliers to adopt certain pricing structures to encourage more efficient farm use and facilitate recycled water use. The legislation also impacted cities by mandating a 20% per capita water use reduction by 2020.

The fourth option is to link land use and water supply planning. Planners often rejected climate as a reason to limit new communities. Traditionally, governments separated land planning and water planning agencies. Society assumed that water suppliers had a duty to meet water supplies for new communities. Professor Tarlock explained how this created golf courses in the middle of desert areas, such as Tucson, Arizona. "Show me" laws like those enacted in California, Arizona, and Colorado require cities and developers have realistic drought proof plans for water supply.

The less likely fifth and sixth options are the introduction of riparian sharing into the prior appropriation doctrine, and increased federal preemption of state water laws.

Finally, the seventh option is to reimplement the use the dam to capture more run-off water. Professor Tarlock first pointed out that dams today differ from dams of the past. Today the use of smaller dams serves as a key component in restoration of aquatic habitats by capturing run-off. The problem with this option is the "Big Dam" era is over, or at the very least in sleep mode, and a trend to remove these dams and restore the land increases.

Professor Tarlock ended by stating that water managers must go through a series of phases before they get to the point where they can adapt to global climate change. The first phase is "Denial." Despite the fact Europe has seemed to accept global climate change, the United States has been slower to accept global climate change. California Governor Schwarzenegger recently recognized climate change as a problem for California. Next is the "Recognition" phase. In this stage, water managers recognize the problem and start researching the problem. Next is the "Get Serious" phase. This is the stage where most water managers are currently. Last is the "What do we do?" phase in which water managers start to take real action to adapt to global climate change. Professor Tarlock ended by suggesting that water managers need to evaluate the changes that they need make and the choices they have to make those changes..

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