# Managing the Colorado River Basin: An Agenda for Use, Restoration, and Sustainability

An Open Letter

# From the 2011-12 Colorado College State of the Rockies Project Student Researchers:

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The 2012 Colorado College State of the Rockies Report Card The Colorado River Basin: Agenda for Use, Restoration, and Sustainability for the Next Generation March, 2012

### Dear Colorado River Basin Water Users, Experts, and Enthusiasts:

The Colorado River Basin has stood out over the centuries as a subject of fascination and intrigue. The **"age of exploration"** dating back centuries witnessed explorers in search of riches from golden cities to cross-continental routes, with the feats of explorer John Wesley Powell magnified in publications and hearings. The **"age of construction"** has similarly provided boundless fascination as human ingenuity and massive amounts of financial capital proceeded to literally "conquer" a massive river for flood prevention, water diversion and storage, as well as transmountain diversion. Many people will endlessly be in awe at the towering Glen Canyon and Boulder Dams with their sprawling Lake Powell and Lake Mead reservoirs, once full but today ironically looking more like partially full bathtubs with dirty rings. The Central Arizona Project similarly is an engineering wonder.

But today we enter into a new age- one we call the **"age of conservation"** for a river and its basin once seen as a boundless water supply that is now being overwhelmed by growing water demands, even as projected average annual supplies shrink. A century of legal definition for "beneficial uses" was formed in the earlier thinking that the basin and its waters would be boundless, there to be diverted and put to "human" use. However, society's values are changing and current water uses and tactics no longer suffice for a future generation that increasingly calls for a different approach for a river "standing through time" as an example of humans wisely using its water while providing for nature's complex beauty and balance.

We represent that "future generation" and through intensive research and observation we have earned "standing" in discussions about the Colorado River's future. In this letter we present **Five Actions** we find are essential if this national, even global, natural wonder is to stand tall and remain dynamic throughout our lives and those of our children. We are convinced that exciting changes are underway "at the margins" of these immense problems and challenges. Aggressive water conservation measures in the West's urban areas are proof we can meet the "frugal" needs of growing urban areas, but not the "frivolous" wants. Experiments with water banking and rotational crops in agriculture convince us that the "old" techniques of flood irrigation in a "use it or lose it" legal structure can be replaced with conservation that does not threaten our ability to grow crops in sustainable agricultural areas of the Rockies. All of these actions will take changes in legal structure and administration, as well as large amounts of new capital. However, if we once found literally billions of dollars in the **"age of construction"** then we know with immense will and perseverance we can fund the **"age of conservation."** And the outcome will gradually result in the Colorado River and its tributaries, as well as the delta, having a reasonable but essential "share" of nature's bounty in the form of sustainable flows all the way to the sea.

Here are the **five actions** we recommend so that a viable, living Colorado River Basin exists, even thrives for our children:

•Action 1: Recognize the finite limits of the river's supplies and pursue a "crash course" in conservation and water redistribution that sustains current users while leaving water in the river.

•Action 2: Modify and amend the "Law of the River" to build in cooperation and flexibility.

•Action 3: Embrace and enshrine basin-wide "systems thinking" in the region's management of water, land, flora and fauna, agriculture, and human settlements.

•Action 4: Give "nature" a firm standing in law, administration, and use of water in the basin.

•Action 5: Adopt a flexible and adaptive management approach on a decades-long basis to deal with past, present, and projected future variability of climate and hydrology.

Each **action** is explained in greater detail at the end of this section, where we collect together the conclusions each of our research efforts has developed and published as a section in this *2012 Colorado College State of the Rockies Report Card*. However, first we summarize two public opinion surveys conducted recently about the Colorado River Basin and its proper management. One examines the opinions of "water experts" and another, conducted by the Colorado College State of the Rockies Project, surveys college-age students. Findings from both put our recommended actions in context and validate their reasonableness and validity.







#### The Evidence from a Survey of College-Age Youth Contrasted with Opinions of Water Experts

How can young people understand the complexities of a massive system like the Colorado River Basin? Are they prepared to grapple with nine decades of enshrined laws and regulations that form the Law of the River? Might they take immature stances on issues that deeply affect existing groups with vested interests in the basin?

In anticipation of such questions being asked, part of our 2011-12 research on the management of the Colorado River Basin has been a survey offered to college faculty throughout the basin for use by students in their courses. We structured the survey as a companion to an "Overview of the Basin," (see page 24-31) which was carefully written and peer reviewed so that college students taking the survey would first have access to the history, operation, and challenges to the basin that abound. Over six months a total of 197 college-age students completed the survey. Four-fifths of respondents were 18-24 years of age; 60% male vs. 40% female; 81% Caucasian; all but 10% undergraduates; and a majority whose home state is in the Rockies region.

To provide a comparison to these views of youth, we obtained permission to report on the results of a similar survey of "water experts" conducted by the Colorado River Governance Initiative and contained in a December, 2010 Report: *Rethinking the Future of the Colorado River*, a part of the Water Policy Program at the University of Colorado-Boulder Law School. A total of 184 people answered the anonymous survey, half water managers/government officials, 30% water professionals, and the rest water users, citizens, and members of non-governmental organizations.

What about the adequacy of the current "Law of the River?" Among collegeage respondents, 90% responded that a new body of laws and regulations should be created to meet new challenges facing the basin in the 21st century. Among "water expert" respondents only 20% agreed that no changes are needed, the current Law of the River being adequate. Another 70% called for minor to significant changes and only 10% called for a fundamental restructuring. Thus, youth and experts alike in large majorities believe that changes are needed in the Law of the River. The survey of "water experts" went one step further and asked when water demand will exceed supply in the basin, thus helping trigger need for changes in management. Nearly 40%

"I think that the younger generation needs to be more involved in all aspects of the future of the Colorado River Basin. Too often are we told that the older generation is sorry for what they are giving us, but we have so little say in changes... at least in an accessible manner. Few young people will search it out. There needs to be more outreach, more education on the matter, and more involvement of students and young adults all around. Combine the resources we have from everyone out there to make the best change possible!"

#### - College-age poll respondent

"Things change over time. It's been almost 90 years since the Colorado River Compact was set. The world has made some big changes since then." - College-age poll respondent

supply in the basin, thus helping trigger need for changes in management. Nearly 40% believe that demand already exceeds supply, another 23% believe that will be the case by 2020 and another 21% believe so by 2050.

How can the basin be fixed? Priority for conservation efforts in the face of a severe shortage of water in the basin received the highest ranking among college-age respondents, with depletion of reservoirs and efforts to augment supply falling lower in priority. Among "water experts" asked to rank solutions, technology to reduce waste (efficiency) and desalination were ranked highest, followed by improved intra-state management and infrastructure updates and expansions.

In handling unmet Native American water rights within an over-allocated basin, college- age respondents interestingly chose recreation as the first use that might be curtailed, followed by industry, municipal use, electric power, and then agriculture; meeting the needs of Mexico and environmental flows were last in line to offer up some water.

Pursuit of efficiency rather than basin augmentation is a strong measure of where college-age respondents come down on conservation of water. They strongly chose pursuit of degrees of efficiency (nearly 95%) over degrees of augmentation. Similarly among "water experts," augmentation ranked lowest as a solution to basin challenges; this means that cloud seeding, vegetation management, and imports from other basins were ranked last.

"Water augmentation on a large scale by whatever means will be very expensive. Conservation has a limit, but I do not think we are even close to that at this point. Managed population growth is a key to the West's water issues."

- "Water expert" poll respondent

"A healthy environmental flow helps to ensure the health of species living in the river. In addition it protects the recreational uses of the river."

- College-age poll respondent

Water for nature registers strongly with college-age respondents; 93% replied that even in the face of extreme water shortage there should be assured environmental flows.

What are the major challenges to managing the basin? In the college-age survey population growth was seen as most serious, then climate change, salinity/water quality, water diversion, and then endangered species. Interestingly Native American water rights and Mexican treaty rights were seen as less of a challenge.

We present this brief glimpse of these two surveys to demonstrate that college-age respondents in some cases closely agree with "water experts" on the major issue of adequacy of the Law of the River. In other cases, priorities of youth are supportive of traditional uses of water in the basin, even ranking "unmet" needs lower than traditional uses for agriculture, industry, and municipalities. Even with only a brief overview of the Colorado River Basin and their class materials and discussion, college-age respondents demonstrate a maturity and sensitivity in prioritizing basin challenges and recommending solutions. This is good news since these young people will soon be part of a generation both inheriting the basin and being challenged to manage it sustainably. **Demographics, Economy, and Agriculture Depend on Water Storage and Diversion:** Is it a Zero Sum Game? bv: **Sally Hardin** 

#### Conclusion: Is the Colorado River Basin Faced with a Zero Sum Struggle?

Decades of immense human ingenuity and vast sums money have been invested in "taming" the Colorado River. is often seen as one of the human wonders of the world: carvout immense reservoirs backed up behind gigantic dams, while version structures carry water hundreds of miles from river itself to fertile agricultural regions and urban areas even vond the hydrologic boundaries of the basin. A steady supof water over the decades, varying by the year according drought conditions, is now rapidly being disrupted by growdemand for water to be put to "beneficial" uses. Colliding with traditional definitions of "beneficial uses," new demands arise maintaining instream flows to protect the fragile riparian areas and vast public lands of the region.

Many believe that the height of human engineering the basin is nearing an end, with a few remaining proposals for massive diversion increasingly being challenged by vironmental concerns. The result: a situation that increasingly existing users against one another, as urban areas seek to obtain ter dedicated to agriculture, and out-of-basin demands seek remaining surplus or unused allotments to individual states.

We have traced the thread of human development the Colorado River Basin in this section, with the purpose seeking answers to what many argue is now a zero sum game. ditional water obtained by urban areas must now come from a decline in water use by agriculture (potentially signaling decline in agricultural production itself). Any further water disions, even pursuing remaining surplus allotments to individstates, must come at the expense of diminished instream flows, thus harming further rivers and their associated flora and fauna.



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Leah Lieber

Should today's youth look at this collision of steady and perhaps dwindling water supplies, as climate changes occur, against rising human demands as the ultimate threat to the basin as we know it? Or are we witnessing in the vibrant experiments discussed above innovative opportunities for new techniques of water sharing and conservation? The tentative answer we reach as Colorado College State of the Rockies Project student researchers is that the future sustainability of the Colorado River Basin remains to be determined. Encouraging signs of conservation and water sharing techniques give hope that our children will inherit a vibrant Colorado River. Water use in the Colorado River Basin need not be a zero sum game. On its current trajectory, it could certainly be classified as such. However, we are encouraged by promising alternatives for water conservation, reuse, and sharing of this scarce resource that together have the power to alter this path of destruction.

Action 1: Recognize the finite limits of the river's supplies and pursue a "crash course" in conservation and water redistribution that sustains current users while leaving water in the river.

> Laws of the Colorado River Basin: **Obsolete or Flexible for a Sustainable Future?** bv: Warren King

#### **Concluding Remarks**

While the issues that remain, such as the unexpected future of the Cienega de Santa Clara, declining native fish populations, and under-served Indian reservations all highlight the rigidity of the Law of the River, one can just as easily look at the minutes created by the IBWC, the water sharing programs established in Arizona and Nevada, and the 2007 Shortage Guidelines as examples proving that disputes and issues can be resolved using the existing framework of the Law of the River and the Compact. What may be most important to acknowledge is what Southern Nevada Water Authority President Patricia Mulroy stated: "The Compact inextricably binds them [the basin states] together in a framework that is as rigid or as flexible as the parties as a whole desire." That is to say, it may not be necessary to choose between stringently adhering to the Law of the River and creating a new Compact. What is most important is the political will of those involved to cooperate. However, given the issues that have arisen, and those that are destined to come, might it not be time to formalize this spirit of cooperation that Patricia Mulroy so vehemently defends? What is needed at this point is an amendment or an addition to the Law of the River, which will take into account the enduring issues and formalize a process for discussion and action on those existing and forthcoming issues.



#### Action 2: Modify and amend the Law of the River" to build in cooperation and flexibility.

Melissa Kolano

### Recreation in the Colorado River Basin: Is America's Playground Under Threat? by:

#### Benjamen N. Taber

#### Conclusion: Is the World Renowned Colorado River Basin "Playground" Under Threat?

This discussion about the future of recreation along the Colorado River and its tributaries is meaningless without placing it in the context of climate change. According to Auden Schendler, Vice President of Sustainability with Aspen Skiing Company, "It's the economic impacts of climate change that we fear." Even if there is snow to ski on in 50 years, people from around the nation and world will not go on a ski trip unless their basic economic needs have been met and exceeded. Even if there is still enough water to raft down Cataract Canyon, no one will without the dispensable income to do so.

So is America's Colorado River Basin playground under threat? In a word, yes. This threat stems from our increased reliance on the basin's water for historically established "beneficial uses" by households, industry, and agriculture. It is derived from our current water management system that views the basin largely as a pipeline, one that divvies up water among the Upper and Lower Basin regions and for Mexico even though the highly volatile water flows historically average less than the allocated 16.5 million acre-feet (maf). It is accentuated by resistance to new uses proposed for water: loosely termed "instream" flows for aquatic systems and adjacent riparian areas. With the increasing scarcity of water and the struggle to fulfill the additional demands people have expressed for Colorado River water, the "new" demands for water of threatened and endangered species needed for their survival must compete with firmly entrenched and well-financed entities hell-bent on squeezing more water "out" of the basin.

#### The 2012 State of the Rockies Report Card

What can today's youth bring to this debate and conflict? Elsewhere in this *Report Card* we discuss the results of a survey, measuring the values of today's college-age youth compared with values of more established "water experts" throughout the basin. We are encouraged by the strength of support for less-traditional water uses in the basin, including instream flows and a desire to remedy the unmet shares of water for Native Americans and Mexico. Tough choices and trade-offs are on the horizon in all aspects of the basin. Yet, we are hopeful that a broader "systems thinking" will prevail, so that balance arises between human demands for water and products from the basin versus the needs of the hydrologic region for sufficient water to remain healthy and supportive of the types of recreation and tourism discussed in this section. Taken together, the various sections of this *Report Card* weave a fabric of solutions and perspectives for today's youth and generations to come: we can have a healthy Colorado River Basin that supports vital economies without destroying vital hydrologic and environmental conditions that make the region world-class! We must keep it so.

## Action 3: Embrace and enshrine basin-wide "systems thinking" in the region's management of water, land, flora and fauna, agriculture, and human settlements.

#### Environment and Ecology of the Colorado River Basin by: Natalie Triedman

#### Conclusion: Nature Needs A Voice and an Assured Share of Water in the Basin

Diversions on the Colorado River send water to urban, agricultural, and industrial areas across the western United States to serve social and economic needs at the expense of stream flows. The result has been changes in the timing, duration, variation, and magnitude of hydrologic conditions, modifications that have had devastating consequences for the water quality and native ecology of the river. Political and public recognition of these issues is gradually increasing, but to simply put these concerns on the political radar is not enough. It is time that we test the flexibility of western water law. The current legal structure, based on prior appropriation and a limited hierarchy of "beneficial uses," is outdated and requires reform. Economic and ecological threats to the Colorado River Basin urge us to improve the water acquisition and use processes so that water remains

for nature under constructs that make instream flow rights legally defensible in all basin states.

It is imperative that we avoid the traditional inclination to solve shortages with further development. In addition to the huge financial burden of any remaining water projects that might be technically and financially feasible, the extraction and transportation of additional water supplies out of the basin would place enormous stresses on an already vulnerable ecosystem. The current situation of decreasing water supply and increasing water demand in the Colorado River Basin requires a fundamental shift in our discourse that provides new ways of thinking about water supply strategies that do not jeopardize environmental needs.

As representatives of today's youth, with a vested interest in the future of the Colorado River Basin, we remain guardedly optimistic that the daunting challenges in the region can be solved while enhancing the role of nature in a healthy region. Past pressures to develop water have largely operated under the assumption that ample water existed to meet numerous, rather narrowly defined, "beneficial" uses. We call upon water experts and stakeholders alike to redefine benefits of water in the basin to give nature "equal standing" for river flows so that riparian ecosystems can be viable into the future. Our generation recognizes the difficult trade-offs, but remains confident compromise is possible. We repeat where we started this section: We are all stakeholders, and the stakes are high!

Action 4: Give "nature" a firm standing in law, administration, and use of water in the basin.



Kim Sundermeyer

#### The Colorado River Basin and Climate: Perfect Storm for the Twenty-First Century? by: Carson McMurray

#### Conclusion: Will the Twenty-First Century be Nasty?

The Colorado River Basin stands at a crossroad today. Water demand has recently exceeded supply, deliveries to Native Americans and Mexico are problematic, and infrastructure is slowly becoming outdated and inefficient. As these evident problems persist, the looming threat of climate change must be added to discussions and basin-wide management. Without careful planning for climate change adaption and lobbying for mitigation, the decrease in stream flow due to climate change will overwhelm all other issues. The conservative estimate for stream flow decrease by mid-century is 6%, which would still threaten the entire basin, from agriculture to municipalities.

Offsetting such a formidable challenge cannot be done in years, decades, or even centuries, but will take constant adaptation to changes in climate and water needs. This flexible adaptive management approach will continually challenge the current Law of the River, and the necessary changes cannot be enacted overnight. While the shortsighted problems of water supply for this year's crops or cities are necessary issues, without a long-term management plan that includes adapting to and mitigating climate change, the basin will inexorably move towards crises. The Colorado River represents the lifeline of the Southwest to over 30 million people. Without consideration of climate change and its effect on water availability, the once productive Southwest will return to its desert roots.

What can today's youth do in the face of such challenges? Traditional approaches to water management in the Colorado River Basin must become more flexible at a minimum, and may even need to be replaced by new management guidelines and legal constructs. The section of this *Report Card* entitled "Laws of the Colorado River Basin: Obsolete or Flexible for a Sustainable Future?" faces this conundrum head-on. In addition, the results of the Rockies Project's survey of college-age youth opinions about Colorado River Basin issues and management bring fresh perspectives to the debate. In the end, it is vital that today's youth become engaged and involved in how our precious natural resources in the basin are managed, for they will soon inherit the results!

Action 5: Adopt a flexible and adaptive management approach on a decades-long basis to deal with past, present, and projected future variability of climate and hydrology.



Leo Tonozzi, Glenwood Springs kayak park

Five Actions to Save the Basin

The 2012 State of the Rockies Report Card



Jerry Brockway



All of the photos used in this section of the *Report Card* are from the 2011-12 Rockies Project *Save the Colorado River Basin* Banner Photo Contest or the 2012 Rockies Project Student Photo Contest. Thanks to all of those who participated and took the time to tell us what they value in the Colorado River Basin.



Veronica Spann





Walt Hecox



John Nestler