Editors' Preface

By Dr. Walter E. Hecox, Brendan P. Boepple, and Matthew C. Gottfried

The 2012 Colorado College State of the Rockies Report Card

Tara Hatfield

The Colorado River Basin: A Unified Project Theme

The Colorado River Basin was the unified focus of all parts to the State of the Rockies Project during summer 2011 and the 2011-12 academic year. This basin encompasses portions of seven states in the American Southwest and continues into Mexico, supplying water to households, communities, businesses and farms, as well as natural ecosystems. Roughly 30 million people rely on the river for water, energy, food, and healthy ecosystems. Climate studies indicate the potential for inadequate water supplies throughout the 1,700-mile river system from the origins of the Green River high in Wyoming's Wind River Range to its historic outlet over the Colorado River Delta, emptying into the Sea of Cortez. Along its twisted path arise majestic mountains, deep canyons, tributaries, and a wealth of flora and fauna. The basin is indeed a natural treasure of world-class caliber, but heavily threatened. We dedicated our focus on the Colorado River Basin in order to help assure that the next generation inherits a natural and economic system as spectacular, diverse, and bountiful as has existed in the past, but is in transition today. The changes currently underway and those needed for the future must have new voices, especially those of today's youth, for they will live with the results.

The region's projected population growth means increased water demand on the Colorado River from municipalities, industry, agriculture, and recreation. Some expert studies predict that by 2050 climate change and burgeoning uses of the river system will result in inadequate water to meet all of its allocated shares two-thirds to nine-tenths of the time. A near century of sanctioned water management under the 1922 Colorado River Compact has largely catered to the traditional "beneficial uses" of water for agriculture, mining, manufacturing, and municipalities. Only in the last decade has society started to assess the needs of nature for water in the basin, sometimes called instream flows, able to nurture and sustain fish, riparian areas, and adjacent lands and vegetation.

Colorado College is grounded in the liberal arts, promoting a broad understanding of the world around us. Maddeningly "liberal" and complex is the Colorado River Basin! We have been challenged as student researchers, supporting river explorers, technical staff, and faculty to create in our own minds an understanding of a basin many experts spend an entire professional life appreciating and helping manage. Summer research, field trips, academic year speakers, and our sponsorship of a "source to sea" kayak trip have all been a

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part of the process of exploration, reflection, and communication, which is the hallmark of the Rockies Project. What we have learned is partly reflected in the content of this *2012 Colorado College State of the Rockies Report Card*. Beyond these student research sections, we have also conducted a survey of college-age students' values and dreams for the iconic Colorado River Basin; extensive use of social-media from photo contests to You Tube, Facebook, and other media have amplified our audience in increasingly participatory ways.

Using A Proven Approach: Research-Report-Engage

Central to this year's activities, as in the past, are the three goals of the Colorado College State of the Rockies Project:

- •RESEARCH: To involve Colorado College students as the main contributors to the *Report Card* and conferences.
- •REPORT: To produce an annual research document on critical issues of community and environment in the Rocky Mountain West (the *Report Card*).
- •ENGAGE: To host annual monthly speakers' series and conferences at Colorado College, bringing regional experts together with concerned citizens.

Research

Summer 2011 Field Trip Perspectives

Supplementing the intense work on campus of each Rockies student researcher during summer 2011, a two-week field exploration of the Colorado River Basin opened up key contacts with experts, provided for first-hand observation, and contributed to better understanding of the complexities of this huge natural and human system.

The State of the Rockies Project summer research team headed south in July 2011 with a tall task- to follow the Colorado River from its headwaters in the Rockies to the Mexican Delta where the river traditionally reached the sea. Covering over 3,400 miles, the trip reinforced the gravity of many issues the team had already been researching from afar at Colorado College.

From Colorado Springs the team crossed over the spine of the Rockies and passed from the Arkansas River Basin into the Colorado River Basin. They met up with the main stem of the Colorado and followed its course through Glenwood Canyon, first in the van on I-70 and then in a raft, viewing the river up close. The researchers then made their way to Aspen, Colorado, to meet with Aspen Skiing Company and continued on to Paonia, Colorado, where they learned about Western Slope agriculture and water issues. After a day spent hiking the Black Canyon of the Gunnison and learning about the issues of the National Park, the research team continued west into Utah.

Stopping in Moab, Utah, and Canyonlands National Park, the researchers met with national park service officials to hear about the difficulties of managing the Colorado River for both its ecological as well as recreational value. Further south the team travelled to Lake Powell and Glen Canyon Dam. A tour of the dam revealed the inner workings of hydroelectric generation and the operations of the Bureau of Reclamation. Following the course of the river, the researchers went to Lee's Ferry, the demarcation line between the Upper and Lower Basins of the Colorado River, and the starting point for all Grand Canyon rafting trips. The Rockies Project team then climbed up the Kaibab Plateau and found themselves on the remote North Rim of the Grand Canyon. After a six-hour drive, the team was in the desert metropolis of Las Vegas.

Meetings with the Southern Nevada Water Authority taught the researchers about the city's various water conserving initiatives and attempts to best utilize their share of Colorado River water. After experiencing Lake Mead and the massive Hoover Dam, the researchers met with Bureau of Reclamation officials in Boulder City, Nevada, to learn about the coordinated operations of the Lower Basin's various dams and diversions. Passing Lake Havasu and crossing Parker Dam, the team headed south to California's Imperial Valley.

Meeting with officials for the Imperial Irrigation District and touring their agricultural production, the research team learned the vital importance of the valley's role in the nation's food supply. On the following day, the team crossed into Mexico and met with members of the Mexican environmental group, ProNatura, to see first-hand Mexican uses of Colorado River water and the state of the dry Colorado River Delta. After touring the Cienega de Santa Clara, the student researchers returned to Yuma, Arizona, where they toured the Yuma Desalting Plant. The research trip then turned northward and back towards Colorado.

Brendan Boepple, Student Researchers touring the Cienega de Santa Clara wetlands with the environmental group ProNatura

A quick stop to tour the Wellton-Mohawk Irrigation District provided another insight into the role of agriculture in the basin and its use of Colorado River water. Further north, the group stopped in Lake Havasu City, Arizona, to meet with Bureau of Land Management officials about regulating recreation in the area, both on the lake and in the surrounding

Brendan Boepple, Rockies Project Student Researchers meeting with Navajo Nation officials

desert. The team travelled to the more popular area of the Grand Canyon, the South Rim. Crossing the Arizona-New Mexico border, the researchers made one final stop in the Navajo Nation to meet with tribal officials. Hearing from members of the nation's water management and rights divisions, the research team learned the issues of the traditionally under-recognized people. One final push across New Mexico and Colorado returned the researchers to Colorado Springs and Colorado College.

Report

The results of each 2011-12 Rockies student researcher reflect a summer of intensive research, the two-week field trip, fall 2011 re-writes, peer reviews, and editing in preparation for the publication of the following sections in this *Report Card*. In addition to sections devoted to each student researcher's topic, ranging from the Law of the River to the Environment and Ecology of the Basin, this year's *Report Card* is also supplemented with additional sections. The first, a basin overview, covers the key issues of the Colorado River Basin that will later be expanded upon more extensively in following sections. Next, a summary of the Rockies Project Source to Sea journey covers the trip of our two Project Field Researchers from the headwaters of the Green River in Wyoming to the Sea of Cortez and the threatened river delta. The last piece to supplement this year's student research is a call to action from our five student researchers through an open letter to Colorado River Basin water users, experts, and enthusiasts.

Will Stauffer-Norris and Zak Podmore: "Kayaking from Source to Sea on the Colorado River: The Basin Up-Close and Personal"

In addition to the traditional student-faculty collaborative research, the 2011-12 State of the Rockies Project also set its sight on another ambitious venture- to raise awareness of Colorado River issues through a Source to Sea journey across the full length of the basin. Starting in early October, high in Wyoming's Wind River Range, our two field researchers began the journey at the headwaters of the Green River. The ensuing 1,700-mile journey brought our researchers up close to many of the river's issues. From struggling to make progress on the river's large reservoirs to shooting rapids in the Grand Canyon, our researchers gained an insight into the whole basin that few others can understand. While their investigation of the various basin issues on a personal level led their concern over the future management of the basin to grow, a number of issues truly resonated with their growing love of the river system. Standing on the shores of Flaming Gorge Reservoir, they contemplated the value of pumping that water some 500 miles to the Front Range of Colorado. Equally as concerning was the delta they discovered at the end of the river. Once a mecca for North American wildlife, it was waterless and choked with invasive species. Setting out to raise awareness of such issues of the basin, this summary of their trip tells their story, as well as the story of the river.

Sally Hardin: "Demographics, Economy, and Agriculture Depend on Water Storage and Diversion: Is it a Zero Sum Game?"

The once wild Colorado River is dammed and diverted more than most other rivers in the entire world. The establishment of state-by-state apportionments in the early 20th century laid the groundwork for extensive development of infrastructure throughout the basin to store and divert every drop of available water. In laying this groundwork, the seeds of conflict were also sewn. The mounting pressures on the basin are coming to a head as municipalities and agriculture vie to secure what water they can for the future. The


Rockies Project Field Researchers paddling the Green River in southern Wyoming

tradition of prior appropriation in Western Water Law looks to spell even more difficulties for an already over-allocated system. However, can a compromise be found between the agriculturalists with their "use it or lose it" doctrine and the ever-growing cities reliant on the basin's water supplies?

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

The Colorado River Basin is governed and litigated by a body of laws, compacts, trials, and treaties known as the Law of the River. The keystone of this body of law is the Colorado River Compact of 1922. The Compact apportioned water from the basin to the Upper and Lower Basin states following the recorded flows of the river from the decade prior to the signing of the Compact. However, as modern issues begin to put pressure on this ninety-year-old document, will the Colorado River Compact be able to bend under the stress or will it break as issues mount? Is a new document necessary to address the modern issues of the basin? Continued climate change, coupled with a failure to address key stakeholders in the basin such as Native American tribes, the Republic of Mexico, and the environment, would say yes. However, other stakeholders would say that the Compact allows for flexibility and compromise in the face of potential conflict.

Ben Taber: "Recreation in the Colorado River Basin: Is America's Playground Under Threat?"

The Colorado River Basin supports recreationists from around the world. From the ski areas high in the Rockies to the desert canyons that make the river famous for rafting, recreation is a basin-wide issue. While tradition has placed the "beneficial uses" of water well above its recreational value, an examination into the role that recreation plays in the basin's economy suggests a paradigm shift in the perception of the great pipeline of the Southwest. Furthermore, an investigation of people's values throughout the basin shows a high value placed on the continued access to the recreational playground that is the basin. However, instream flows have never been granted for recreational purposes and the other stresses on the basin continue to mount. From proposals to diminish the flow

Carola Lovering, A fly-fisherman in Colorado's Gore Range

Maria Gades

of the Green River through extensive diversions, to the manipulation of flows through the Grand Canyon by Glen Canyon Dam and its massive reservoir, Lake Powell, recreation in the basin needs a voice in the ongoing discussion of the river's future.

Natalie Triedman: "Environment and Ecology of the Colorado River Basin"

From the majestic scenery of the Rockies to the treasure of biodiversity in the Colorado River Delta, the basin is home to a diverse collection of ecosystems that support a plethora of flora and fauna found nowhere else in the world. Following the river system from its headwaters to the sea helps one to understand the integral role that the riparian environments dependent on the river play in the larger basin-wide system. However, the history of the river stressed diversion and storage over the historical flow regime and left environmental values entirely absent from the basin's management. As municipalities and agricultural entities stake their claims in the face of projected diminished flows due to a changing climate, who will stand for the environment? The establishment of instream flows for environmental values has begun, but is piecemeal. What should be done to address the environment and ecology in the basin under these mounting pressures? Acknowledgement of the environment's key role in all aspects of the use of Colorado River water continues to gain

momentum, but can something be done soon enough?

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

The climate of the Colorado River Basin has always been unpredictable. From the headwaters high in the Rockies to the deserts of the Southwest, climatic volatility is more the norm than the outlier. A history of the region through paleoclimatology shows a pattern of drought accentuated by the rare wet years. The changes in our current climate point to only greater vicissitudes in the system as we enter the 21st century. With projections of substantially decreased flows and changing seasons, what should the basin expect in the coming years? Can the infrastructure from the basin's "Age of Construction" stand the test of the changing climate or must other solutions be sought? To start, projections of increased evapotranspiration threaten the large reservoirs, already losing substantial amounts of water to evaporation, but are drastic measures for augmentation necessary to divert disaster?

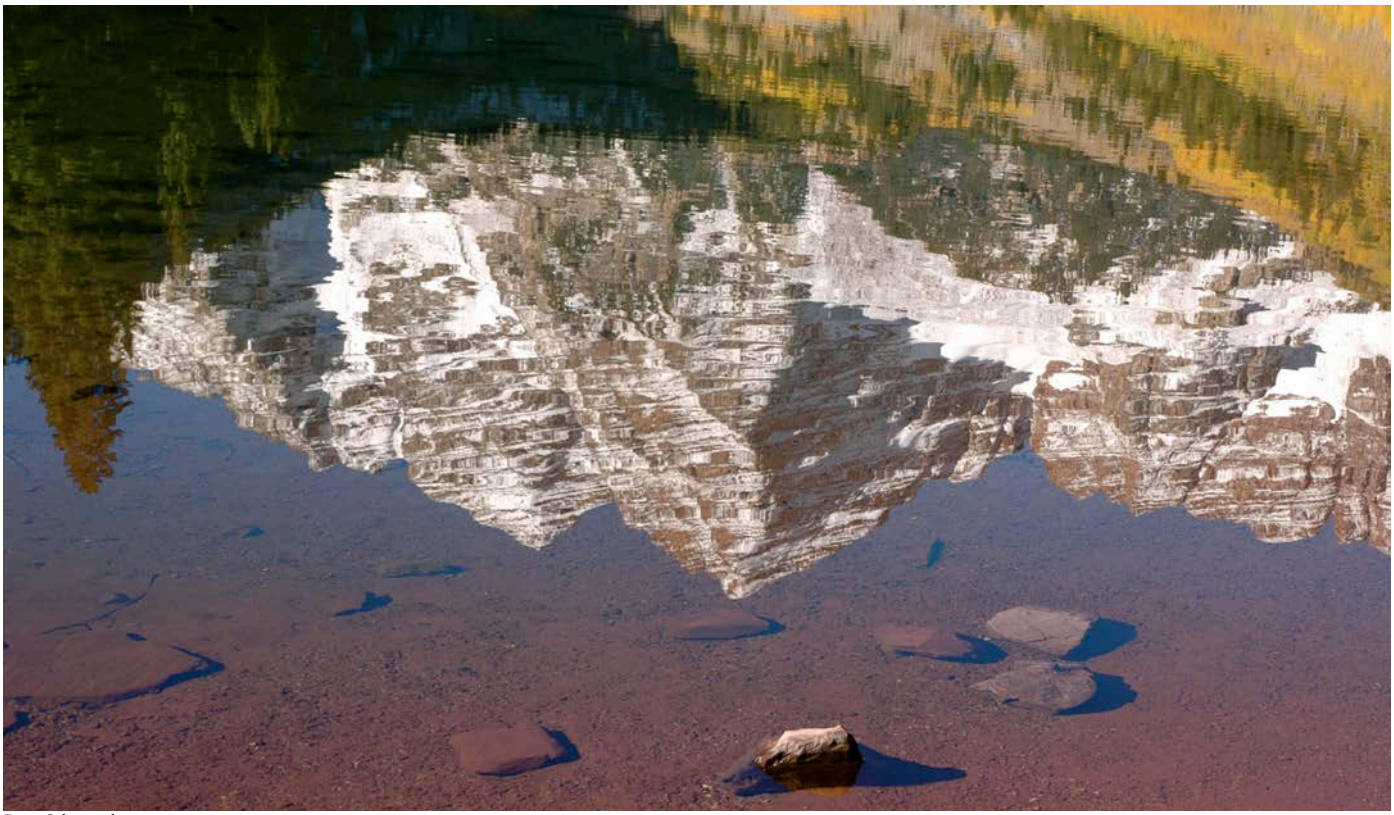
Student Research Team: "Managing the Colorado River Basin: An Agenda for Use, Restoration, and Sustainability-An Open Letter"

The "Five Actions" outlined in this section for the future management of the basin represent an accumulation of all the knowledge captured in this year's *Report Card*, coupled with a comparison of two public opinion surveys. The first survey, conducted by the Rockies Project, polled college-age students, the other survey, conducted by the Colorado River Governance Initiative, gauged the opinion of "water experts" already influencing decisions in the basin. This section, an open letter to those invested in the basin in one form or another, lays out suggestions for the future management of the basin from the next generation who will soon be working to manage the river system for use, restoration, and sustainability.

Engage

Monthly Speakers Series

Our understanding of the basin has been assisted by a stellar range of monthly speakers, drawn from a range of experts and authorities. Two widely-acclaimed explorers, naturalists, and National Geographic contributors Pete McBride and Jon Waterman provided a September, 2011 overview of the Colorado River "flowing through conflict" as a comprehensive introduction. Next we explored the Law of the Colorado River Basin in October, 2011 with Colorado Supreme Court Justice Gregory Hobbs and University of Wyoming Law School professor Larry MacDonnell. In November, 2011 environmental perspectives were initiated in a session featuring Bart Miller, water program director for Western Resource Advocates, Jennifer Pitt who manages the Environmental Defense Fund's initiatives on the Colorado River, and Tom Chart, involved in the endangered fish recovery efforts of the U.S. Fish and Wildlife Service. Sticking to environmental issues, in December, 2011 we organized a panel titled "The Colorado River Basin and Climate: Perfect Storm for the 21st Century?" with three speakers: Beth Conover, editor of *How the West Was Warmed* serving as moderator; Stephen Saunders, president of Rocky Mountain Climate Organization; and Jeff Lukas, Associate Scientist for Western Water Assessment run by the National Oceanic and Atmospheric Administration and the University of Colorado at Boulder. Switching directions, our January, 2012 session explored the "unheard voices" of Mexico and Native American Tribes in basin issues and management, featuring Bidtah Becker, Water Rights lawyer for the Navajo Nation Department of Justice, and Osvel Hinojosa, Director of Mexico's Pronatura Noroeste's Water and



Ryan Schumacher

John Barker, Sunset over Lake Powell

Wetland Program. Completing the wide-ranging series we featured "healthy forests" for the basin, presented by Harris Sherman, U.S. Department of Agriculture Undersecretary for Natural Resources and the Environment (overseeing both the U.S. Forest Service and the Natural Resources Conservation Service).

The combined perspectives from these six monthly talks about the basin represent an ambitious, comprehensive coverage of key basin dimensions and challenges, from complex hydrologic, environmental, and socio-economic dynamics to how the basin may be impacted by potential future climate scenarios and the burning issues of unmet water needs by underrepresented Native American and Mexican people. Alongside college and community attendees, the Rockies Project staff and students have benefitted immensely from the depth of each talk and the breadth of the different approaches.

April Rockies Conference

The unveiling of this *2012 State of the Rockies Report Card* once again offers us an opportunity to celebrate the Rockies region with an annual conference on April 9-10, 2012. Opening the conference on Monday, April 9th, our Rockies Project Field Researchers, Will Stauffer-Norris and Zak Podmore, will present a multimedia presentation of their trip, including the premiere of a film covering their entire trip from source to sea. Later that evening, the Colorado College community will welcome the Secretary of the Department of the Interior Ken Salazar, and the Director of the U.S. Geological Survey Marcia McNutt. The two Colorado College alumni, already heavily involved in the management of the Colorado River Basin, will address the future challenges for the Department of the Interior in managing the complex river system. Sessions on Tuesday, April 10th, will center on the state of Colorado's involvement in the future management of the basin. A noon-time session with Colorado Governor John Hickenlooper will focus on youth and the future of Colorado's water. The day will be enriched by an afternoon session with photographer, author, and teacher Stephen Trimble titled: "Bargaining for Eden: In Search of Visionary Conservation on the Colorado Plateau." The final session of the conference that evening, titled: "Colorado's Stake in the Colorado River Basin," will bring together water management officials from across the state to address the challenges for managing the Centennial State's water in the 21st century.

Saving the Colorado River Basin: Join In

For this, our ninth year of the Rockies Project, we have sought to take research-report-engage to new heights, mixing traditional dimensions with new social media, speaking to younger audiences in more visual and interactive ways. We have also "gotten off the fence" by taking a stand with our "Five Actions" that will help save the Colorado River Basin for the next generation. We urge you to be "active" in learning about, enjoying, and helping to protect the spectacular vistas and regions Colorado College is blessed to call "our backyard." Get out there and join each new class of CC students and many of our alumni and friends who seek solitude, recreation, and enrichment from these spectacular, but fragile, environments. Speak up for a Rockies region that can and must be healthy as a regional economy and environment. Your children and their children will thank you!