Damming Grand Canyon
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As a graduate student thirty years ago, I chose for my thesis a stretch of buckled rock along the Colorado River within Grand Canyon that could only be reached by boat. I carried the most up-to-date equipment—kapok-filled Mae West life preservers, a pocket calculator that could actually determine square roots, and plan-and-profile maps of the river corridor that Claude H. Birdseye had prepared fifty years earlier. I was a little troubled that the Birdseye maps were sprinkled with references to twenty-nine dam sites between Lee’s Ferry and Black Canyon. But I wasn’t too worried; hadn’t David Brower and his Sierra Club saved the Grand Canyon from the dam-builders’ antics in the 1960s?

How quickly we forget. At the turn of the twentieth century, entrepreneurs in the American Southwest were breathless with the possibilities of harnessing nature and harvesting its bounty. Surely the deserts would bloom if only crops could be sprinkled with holy water from the untapped Colorado River. Itinerant schemers and voluble visionaries lined the banks of the river, waiting for their chance to send water to California’s Imperial Valley, to vegetable fields in Mexico, or even all the way to Los Angeles. But the Colorado had proven unruly with its track record of untamed floods punctuated by intermittent drought. Early attempts at water diversion were scuttled by flimsy headgates and fishy finances, stymied by disastrous flooding of the very lands that developers had billed as the future of a new West.

What was needed was a plan to control the river. And a plan required knowledge of the topography through which the river flowed. Maps in the middle of the nineteenth century had remarkably little to say about the canyons of the Colorado River. In 1869 and 1871–72, John Wesley Powell had successfully navigated much of the Green and Colorado rivers from Wyoming to Arizona and California, but his accounts were peppered with far too much hyperbole to be useful to engineers. By 1890, Robert Brewster Stanton had surveyed a hypothetical railroad through Cataract, Glen, and Grand canyons. The railroad would never be built, but the survey alone offers insight into the busy-beaver fervor of these early explorers: they truly believed that anything was possible.
Technological achievements never happen in a cultural or political vacuum. Railroads that had so recently stitched together the Atlantic and Pacific coasts were stoked as much by coal as by the religion of Manifest Destiny. The explosion of agriculture across the continent had been ignited as much by a Jeffersonian belief in the dignity of farming as by a fly-blown optimism that rain always follows the plow. Powell had tried, courageously and unsuccessfully, to link agricultural development of the West with the availability of water. But he was shouted down by self-interested speculators who were selling empty dreams, not sustainable communities.

The United States Reclamation Service, drawn like a rib from the U.S. Geological Survey in 1907, was responsible for water development throughout the nation. The USGS retained its keen interest in the science of water and rivers, especially in the arid Southwest. By the early 1920s, the Reclamation Service had focused on a few specific dam sites for the lower Colorado River, while the Geological Survey continued to peripatetically collect data about stream flow and canyon morphologies throughout the West. Both agencies were all too aware of the urgencies being created by the explosive growth of Southern California, with its appetite for water and power. In 1922, sharp knives drawn from all seven states bordering the Green and Colorado rivers had carved the region into upper and lower basins, unknowingly overallocating its resources at the outset of distribution.

Private power and water interests had been surveying the Colorado River system since the turn of the century. While the Reclamation Service somewhat prematurely insisted on a one-dam solution for control of the river, the Geological Survey thought instead to survey wider reaches of the river system—the San Juan River in 1921 and Green River, Glen Canyon, and the lower Colorado in 1922. The crowning jewel in this series of explorations would be the Geological Survey’s 1923 expedition through Grand Canyon, led by Claude Birdseye.

Birdseye, an athletic 45–year-old distant cousin to the world of pot pies, turned out to have all the requisite personality traits that would be required to hold this expedition together. His crew consisted, among others, of a destructively headstrong hydrologist, a capable but often petty head boatman, and one true hero who happened to be an alcoholic. Two months and nineteen days after beginning their voyage at Lee’s Ferry, Birdseye and his men would emerge from Grand Canyon not only having met the
not-inconsiderable demands of life on the water but having also accurately mapped the Colorado River and relevant stretches of its bedrock geology. Beyond being survivors, they were scientists. Despite rotten-bottomed boats, a conflicted crew, and a temperamental river, the 1923 expedition was able to accurately observe the Grand Canyon and commit those observations to a map whose integrity I could still rely upon fifty years hence.

Who were these people who dared dream of damming the Colorado? They were geologists, hydrologists, and engineers who were products of their day. Herman Stabler was a topographer who joined the trip midway, near Phantom Ranch. Upon reaching the river, Stabler wasted few words setting the scene before plunging into the first of many dam site descriptions in his diary. Four days later, he loosened up a little, commenting that he “enjoyed riding the rapids.” The following day, Claude Birdseye sighed for just a second and then acknowledged that his proposed dam site at Ruby Rapids might have engineering drawbacks, but at least it wouldn’t inundate Bright Angel Creek and Phantom Ranch. Beyond this brief reflection, no members of the party expressed concerns about the havoc that their imagined dams would wreak. I shudder to think of a Grand Canyon reduced to a series of tubs and spigots, but is it reasonable to impose twenty-first-century environmental judgments upon these early-twentieth-century men? They were firmly rooted in the American values and enthusiasms of their time. Let them dream of their dams.

They were scientists, though, if not immediately recognizable to everyone today. After all, didn’t the crew just tinker with alidades, scramble over cliffs, and scribble lines on soggy paper? A better question would be how has geologic science changed over time at Grand Canyon? John S. Newberry arrived first on the scene in 1858, and appreciated that the canyon was a world-class showcase for the powers of erosion. What a scientist Newberry was, and, man, could he grow a beard! Powell followed a decade later, hypothesizing about down-cutting of the river and uplift of the Colorado Plateau. His right-hand-man, Clarence Dutton, understood that nearby higher formations had once covered the region before being stripped off. Dutton published these thoughts in 1882 in that most eloquent of scientific treatises, *The Tertiary History of the Grand Cañon District*. Geology to these pioneers was a descriptive sport. The science would begin to branch out in the twentieth century, though.
Eliot Blackwelder and Chester Longwell wrestled with questions about evolution of the Colorado River’s course through Grand Canyon. Eddie McKee systematically measured, defined, and published interpretations of almost all of the canyon’s sedimentary layers during the nineteen forties, fifties, and sixties. George Billingsley first huffed and puffed through the canyon while trying to keep up with Harvey Butchart in 1966; since then he, more than anyone else, has single-handedly mapped all of Grand Canyon’s geologic strata and structure. Since the 1980s, flocks of young academics, like Karl Karlstrom, have perched on ledges throughout the canyon, pecking at its Precambrian basement while trying to fit the Vishnu Schist and Zoroaster Granite into a larger tectonic framework. Ivo Luchitta investigated adjacent sedimentary basins and overlying basalts, trying to understand how and when the river melted through these rocks. Bob Webb focused geologic attention on the role of debris flows that can obstruct the river and twist it into rapids.

How does the Birdseye expedition fit into this parade of science? Snugly, I would say. Early geologists were explorers. The next wave—including Birdseye—were mappers. Then came interpreters, followed by theoreticians. One last approach to canyon science remains in this parade, but we will get to that in a moment. The Birdseye expedition was charged with answering a single question: where can dams be built? The obvious corollary question—where should dams be built?—existed in a parallel universe, to be answered, not by Birdseye, but by society at large. One member of the expedition, hydrologist Eugene La Rue, made the unpardonable mistake of taking the answer upon himself.

La Rue believed that, in addition to a handful of smaller structures, high dams at Bridge Canyon and at the foot of Glen Canyon would best serve the water needs of the Southwest. He had not counted on the power of already-vested interests in Los Angeles and Washington D.C. to hold sway over his impeccable scientific logic. A decade after the 1923 expedition, La Rue watched in dismay as Hoover Dam was constructed in a location he did not favor. La Rue died in 1947, nine years before construction would begin at Glen Canyon Dam, a massive concrete arch whose design incorporated some of his original ideas. In defeat, La Rue had failed to understand that, in the rigged race between science and public policy, it’s safer to put your money on politicians than scientists.
A “new” type of science has turned up at Grand Canyon in the last few years, one that feeds on policy and is funded by water and power interests. Glen Canyon Dam is pretty good at holding back water, and very good at generating spikes of electrical power. Since 1982, biologists, archaeologists, and geologists have descended upon the shores of the Colorado like hordes of grasshoppers, pulling up every hapless tamarisk they can find, and analyzing every sand grain that hasn’t yet been flushed downstream by the dam’s variable releases of clear water. These men and women are committed to Grand Canyon, convinced that they have undertaken an important mission, and confident that they can make a difference. And yet, a quarter century and hundreds of millions of dollars later, they haven’t been allowed to save a single endangered species or forestall the deflation of a single beach. Politics and power win again. Perhaps theirs is not really a new science, though. After all, none of the dam sites surveyed by Birdseye was ever built either.

In the end, I am drawn to the individuals who made up the Birdseye expedition, rather than anything they did or did not accomplish. Raymond Moore, a true geologist, was ecstatic to discover ancient “calcareous algae” mats above Bass Camp. Felix Kominsky was the prototypic happy cook about camp, always ready to laugh or help. Birdseye, though focused on getting downriver, was always willing to declare a day “Sunday” if he sensed that his men were overtaxed. Best of all, I admire Frank Dodge who consistently put the expedition’s success before any personal consideration. A powerful swimmer, he dove into the river to rescue head boatman Emery Kolb who had flipped in Upset Rapids. Dodge, like people with whom I would later commercially row, was a drifter, lost in his cups, and died before his time. But he was one of those bigger-than-life men, an appreciative realist who wrote, “Incidentally, Birdseye was the finest boss I ever had.” Dodge understood the beautiful jealousy that all river runners feel for the Grand Canyon once we have seen her from the inside out.

Michael Collier
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