

## AFD Ep 444 Links and Notes - The End of American Dams [Bill/Rachel] - Recording Oct 16, 2022

- [Intro - Bill] For hundreds of years, damming American rivers and streams was widely viewed as a sign of the progressive march of civilized society and some of the dams ranked among the country's proudest engineering and technical achievements, growing larger and larger, even as fish struggled in ever-greater numbers to reach their spawning grounds and fertile river outlets [turned to barren deserts](#). But after 1976, the great American dam-building era was definitively over and public (as well as official government) attitudes shifted markedly in the opposite direction. Although there was a very dramatic specific endpoint, the change in views had been a long time bubbling further upstream. Let's look this week at what happened.
- [Rachel] <https://energyhistory.yale.edu/units/end-big-dam-era>
  - The late 19th and early 20th Centuries were the era of the "Big Dam", where large-scale dam construction was a demonstration of American engineering might, bringing hydroelectric power and economic growth to the country. However, as the downstream effects (pun intended) accumulated, they became harder to ignore.
  - *Grand Coulee and the Dalles Dam on the Columbia River, for instance, inundated the river's last dip-net fishing sites. Garrison Dam on the Missouri River displaced 90% of three affiliated tribes. Environmental costs were equally devastating. Concrete walls trapped sediment, drowned wetlands, and dramatically transformed river ecologies. Salmon symbolized this ecological tragedy, particularly on the Columbia basin where salmon catches plummeted two-thirds by 1960; by the 1990s, several Pacific salmon species were officially "endangered."*
  - The major turning point occurred in the 1950s, when the Reclamation Bureau proposed building a large hydropower and storage dam in Echo Park, in Dinosaur National Monument, as part of the Colorado River Storage Project (CRSP). The Sierra Club and other environmentalist groups opposed the Echo Park project, and after a protracted battle, got the Reclamation Bureau to remove the Echo Park Dam from their plans. This was the first major anti-dam victory, and environmentalists followed up this success with two more, opposing dams built right outside Grand Canyon National Park. Those proposed dams would have created lakes at the Grand Canyon's southern and northern ends. As a concession, the Reclamation Bureau built the coal-powered Navajo Generating Station to meet electric power demand in the region.
  - Another major blow to the Big Dam Era were the National Environmental Policy Act of 1970 and the Endangered Species Act of 1973. These acts created legal obstacles to dam construction that environmental groups could use to their advantage, slowing or halting construction while cases slowly wound their way through court. Also, legislators were reluctant to fund large-scale dam construction projects during the economic turbulence of the 70s. Another factor was the proliferation of nuclear and fossil-fuel power plants. The share of hydroelectric power generation fell from over 30% in 1940 to only 12% in 1980.
- [Rachel] <https://www.glencanyon.org/history-of-the-river-restoration-movement/>
  - One of the major missteps that the anti-dam opposition made was in agreeing to CRSP's other plans in response to canceling the Echo Park Dam project. The Glen Canyon Dam was one of those projects. Despite the Sierra Club seeing how big an error they made, they had no recourse to stop the construction of Glen Canyon Dam. In 1963, the dam was completed and the canyon was inundated by the Colorado River. *David Brower, the Sierra Club's executive*

director at that time, called Glen Canyon Dam “America’s most regretted environmental mistake.”

- The Glen Canyon Dam has now become the focal point of anti-dam activism. From the Yale website: *The decline of dam building coincided with a movement to dismantle hydropower dams and “restore” rivers. Anti-dam literature and demonstrations in the 1970s focused on Glen Canyon Dam, which inundated a scenic canyon upstream from the Grand Canyon. Edward Abbey, through his Monkey Wrench Gang of eco-saboteurs, and Earth First! activists dreamed of blowing up Glen Canyon.*
- [Rachel] <https://www.usbr.gov/pn/snakeriver/dams/uppersnake/teton/index.html>
- [https://en.wikipedia.org/wiki/Teton\\_Dam](https://en.wikipedia.org/wiki/Teton_Dam)
  - Teton Dam was constructed from February 1972 to June 1976. The Bureau of Reclamation designed the dam and awarded the construction contract to Morrison-Knudsen Company, Inc. The award totaled \$39,476,142.
  - *On June 5, 1976, Teton Dam in southeastern Idaho catastrophically failed. Early that Saturday morning, bulldozer operators tried in vain to plug seepage holes on the downstream face of the dam. By 11 a.m., a torrent of water ripped through the dam, releasing more than one million cubic feet per second. The communities of Sugar City, Rexburg, and Wilford were battered by the trees, houses, cattle and cars carried by the floodwaters. In the end, 11 people died and there was millions of dollars in property damage.*
  - In addition to the loss of life and livelihoods, the environmental impact was immense. *The force of the failure destroyed the lower part of the Teton River, washing away riparian zones and reducing the canyon walls. This seriously damaged the stream’s ecology and impacted the native Yellowstone cutthroat trout population. The force of the water and excessive sediment also damaged stream habitat in the Snake River and some tributaries.* Also, tens of thousands of acres of land near the river banks were stripped of topsoil.
  - An investigation of the collapse found two probable causes, though an actual cause wasn’t determined: the first was the flow of water under highly erodible and unprotected fill, through joints in unsealed rock beneath the grout cap and development of an erosion tunnel. The second was “cracking caused by differential strains or hydraulic fracturing of the core material.”
  - After the collapse of the Teton Dam, the Safety of Dams Act was enacted November 2, 1978. It’s “An act to authorize the Secretary of the Interior to construct, restore, operate, and maintain new or modified features at existing federal Reclamation dams for Safety of Dams purposes.” Under this Act, all Bureau of Reclamation dams are periodically reviewed for resistance to seismic activity and for physical deterioration over time.
- [Rachel] <https://www.glencanyon.org/history-of-the-river-restoration-movement/> Modern anti-dam activism
  - The movement is now focussed on a few areas of attention
    - *Floodplain Protection: Floodplains act as sponges to store water, filter sediment, and reduce the velocity of rivers during high-water periods. Periodic flooding is crucial to the rejuvenation of riparian habitats. This protection is key to the survival of many rivers, including, for example, the Greater Yellowstone rivers, where construction is a major threat.*
    - *Hydropower Dam Relicensing: The Federal Energy Regulatory Commission (FERC) has jurisdiction over many hydropower dams, and must license them to dam their rivers for hydropower generation. Licenses typically last 30-50 years. During the relicensing procedure,*

*interested members of the public can provide input into the Environmental Assessment (EA). This is currently underway with the Santee-Cooper Hydroelectric Project. Bureau of Reclamation dams are, however, not subject to FERC relicensing.*

- *Water Quantity: Inadequate flow in rivers is caused by over-allocation, sprawl, and agriculture. Natural flow must preserve resources and values, which include fish as well as recreation. American Rivers and the Washington Environmental Council are working together to address this issue on the rivers of the Pacific Northwest.*
- *Dam Removal: Actual dam removal has long been viewed as a radical, fringe facet of the river restoration movement. The paradigm has shifted over the last decade.[...] Hundreds of small dams have filled with sediment and are being considered for decommissioning. The Matilija dam on the Ventura River, which is 200 feet high, has filled with sediment, and it has become necessary to remove it to arrest further destruction to the river corridor and ecosystem downstream. As another example of negative impacts, the water in the Columbia River frequently exceeds the maximum tolerable temperature as a result of dams*
- [Bill] There is also a movement in the Eastern United States (especially in the historically densely developed northeast with decent elevation changes) to gradually remove abandoned mill dams from the 19th century & earlier. These dams were sometimes built on navigable rivers and streams but often were built on sections that were rocky or tidally inconsistent in order to provide water-wheel power for early mills and factories and eventually sometimes later on ([beginning in 1880](#)) to generate electric power. They were typically less likely to be used for irrigation roles than in the West, given the differences in climate, rainfall, and water use laws between the regions. To give a sense of the scale of the situation there, [the Hudson River Valley in New York State has roughly 1,600 dams on its various tributaries](#), and that is just one of the many, many rivers across the region, all in a similar situation. The reasons in favor of the dam removal position in the eastern US are that these dams are generally not in use but remain in place with the various ecological consequences that even small dams can bring, and that multitudes of these very old dams have been officially assessed as being at significant risk of collapse from severe weather events and tree falls. Fixing them to a safe level would be very expensive and arguably pointless. There are, however, also serious concerns about the consequences of removing them, not only after centuries of their existence modifying the local ecology (especially in cases where the dams block tidal estuary flows deep inland), but also because of how many bad industrial runoff chemicals like PCBs now linger in the sediment buildup behind many of these dams. Keen listeners to this program will recall that even in the late 19th century, as we discussed on [my mini-episode about the creation of the US Fish Commission](#), it was already becoming apparent that factories generated all kinds of horrendous river-borne pollutants hostile to life, and that problem only grew worse with the rise of synthetic industrial chemistry, which we've also discussed [on past episodes](#). A lot of those chemicals are now believed to be slumbering behind these abandoned and dilapidated dams. Nevertheless, the government of the Commonwealth of Massachusetts has made dam removal at least in some cases an official priority – and one they celebrate. The Division of Ecological Restoration has released a 6-part docu-series with UMass Amherst on 8 recent dam removal projects: <https://www.mass.gov/info-details/river-run-a-story-of-dam-removal-in-massachusetts> The US Geological Survey is similarly enthusiastic about dam removal, stating that *“Aquatic connectivity projects, such as removing dams and modifying culverts, have substantial benefits. The restoration of natural flow conditions improves water quality,*

*sediment transport, aquatic and riparian habitat, and fish passage. These projects can also decrease hazards faced by communities by lowering water-surface elevations of flood waters and by removing the risk of dam breaches associated with aging or inadequate infrastructure.”*

<https://www.usgs.gov/publications/hydraulic-modeling-selected-dam-removal-and-culvert-retrofit-sites-northeastern-united>

UMass Amherst and the Woods Hole Oceanographic Institute have also released a study in February 2021 finding that the volume of sediment trapped behind these small New York and New England dams has likely been greatly overstated and in many cases the sediment effects of removing the dams would be minimal downstream. Some 600 such dams have already been removed in these states anyway.

<https://www.cns.umass.edu/news-events/news/umass-amherst-researchers-discover-low-sediment-levels-behind-dams-northeast-us>

- [Bill] Dam removal on both ends of the country is chugging along now. According to a report by AmericanRivers.org, which has a dam removal tracking database, *“Fifty-seven dams were removed in 2021, reconnecting more than 2,131 miles of rivers.”* This occurred in 22 different states and brought the recorded national running total of removed dams since 1912 up to 1,957. We will probably cross the 2,000 removed dams milestone in a couple years. The infrastructure bill that Congress passed in 2021 included “\$2.4 billion for the removal, retrofit and rehabilitation of dams”  
<https://www.americanrivers.org/2022/02/new-report-alert-free-rivers-the-state-of-dam-removal-in-the-u-s/>