DOHUK, Kurdistan Region—The Mosul Dam is at risk of collapsing in several areas and the safety of Iraq’s second largest city is at risk, said the director of the dam, who is calling for urgent action. “If it collapses, most of the city of Mosul will be flooded and up to half a million people could immediately be endangered,” Riyaz Izzadin, the dam director, told Rudaw on Wednesday.
Izzadin said last year's airstrikes and clashes between Peshmerga forces and Islamic State militants have “substantially” damaged parts of the dam, which stretches 3 kilometers and towers 113 meters. It provides the city of Mosul 750 megawatts of power.

“The US personnel are frequently visiting the dam and are well aware of the dangers, but they don’t want to say it to us openly,” Izzadin said, adding that it could trigger panic among residents in Nineveh province. The multi-ethnic city of Mosul is home to 660,000 people, while the urban population of the province ranges from 750,000 to 1.5 million, according to United Nations data. More than 400,000 Kurds live in the province. Located 50 kilometers north of the city on the Tigris River, Mosul’s dam is the largest in Iraq and fourth largest in the Middle East. It was completed in 1986 after decades of preparation and construction at an estimated cost of $1.5 billion. ISIS militants captured the dam in August 2014 when they overran the city of Mosul and its surrounding villages. Peshmerga forces, backed by US airpower, retook control of the dam after days of clashes later in August. 

A Kurdish commander in charge of security at the dam said ISIS still hopes to gain control of the dam as it provides their captured territories electricity. “The militants attacked our positions at the dam just recently and killed 6 Peshmerga soldiers,” Lt. Jamal Mahmoud told Rudaw. He said he is suspicious of local people collaborating with ISIS. “We give them electricity, they give us bullets,” Mahmud said

More work planned for Lake Altoona Dam

ALTOONA, Wis. (WEAU) -- More work will need to be done on the Lake Altoona Dam than first expected. The initial work on dam began on the downstream side and was budgeted for $431,000 – half of that cost covered with grants from the state department of natural resources. But now, more work on the dam will need to be done – this time, on the upstream side of the dam.

"As the water was drawn down, they noted that there were repairs which needed to be done on the upstream portion of the concrete," Eau Claire County administrator Kathryn Schauf said to WEAU 13 News on Friday. The discovered wear and tear is not out of the ordinary. "The deterioration we're seeing there is typical of old concrete deterioration," Christopher Goodwin, water resources manager with Ayres Associates – which is overseeing the engineering on the dam – said to WEAU 13 News on Friday. "It's right at the water line - the freeze/thaw line, so that is where the most deterioration occurs. So, that kind of deterioration is to be expected.” While this new erosion on the upstream side of the dam is going to add to the overall work load, Goodwin said he's glad they caught it when they did. "There's not a structural issue that we're concerned with," he said. "They should be fixed, but it's not the kind of thing that has to be done right away. Because the lake is drawn down, it makes sense to do that repair job now."

A proposal for work on the upslope portion of the dam will be drawn up by Ayers Associates within the next week, with bids for the project to be expected soon after. Schauf estimates the additional work to cost around $200,000 and Eau Claire County will look to get grant money to assist.

(For your amazement.)

Title Roosevelt Dam, Ariz.Summary Photograph shows view from elevated vantage point of the Roosevelt Dam and spillways.


Copy obtained from the National Performance of Dams Program: http://npdp.stanford.edu
(The new reason.)

Please breach the dams | Letter
Dec 5, 2015, islandssounder.com

Breach the Snake River dams so we can feed our baby orcas. No baby orcas were born and lived for most of a three-year span, and now with many baby orcas born in the past year, we wonder how they will all make it. We have many salmon now, but just last year we lost J32 Rhapsody, a fully pregnant female, to nutritional deficiency. The water is warmer and things are dying up and down the coast. The salmon may not fare as well in coming years. I remember in the years before the capture era, there were many more salmon, and they were especially tasty from different home rivers. But they stopped coming and a lot of things changed. If you could change back one thing? Bring back the salmon. Give them back the thousands of miles of spawning home waters that were blocked. Remove the four lower Snake River Dams. This is good for your families too. Please do it so we may raise more healthy orcas and move away from this looming threat that we will disappear forever into extinction. We need your help. Breach the dams. Thanks for listening.
Mayor Granny

(Reminder of why we do what we do.)

ASDSO Marks Tenth Anniversary of Destructive Missouri Dam Failure
Consequences could have been must worse; timing likely saved lives.

“The tenth anniversary of the Taum Sauk dam failure serves as a reminder of the very real need for constant vigilance in dam safety,” said Lori Spragens, Executive Director of the Association of State Dam Safety Officials. In the early morning hours of December 14, 2005, the Taum Sauk Upper Reservoir Dam failed, sending a destructive wall of water...
through Johnson’s Shut-Ins State Park, one of Missouri’s most popular recreational areas. Fortunately, no one was killed by the torrent, but it demolished the home of Park Superintendent Jerry Toops, and swept him, his wife Lisa, and their three young children into a patch of trees about a quarter mile from where their home once stood. Two truck drivers crossing the highway below the dam also narrowly escaped with their lives.

(Southeast Missourian, 12/15/05)
Situated on top of Proffit Mountain in southeast Missouri, the Taum Sauk Upper Reservoir was one of two reservoirs comprising a pumped storage hydroelectric energy center owned and operated by Ameren Missouri. The upper dam failed when instrumentation that regulated water flow into the upper reservoir malfunctioned, causing excess water to be pumped into the reservoir until it overtopped. As the 55-acre reservoir washed over the dam, a 680 foot-wide section of the earthen embankment failed suddenly, releasing a 40 to 50 foot-high wall of water down the mountainside, stripping vegetation and soil down to the bedrock. The floodwaters inundated State Highway N, pushed vehicles from the road, ripped apart the occupied home of the state park superintendent, and covered the state park campground—thankfully empty at the time of the failure—with up to 40 feet of water. The combination of water and sediment caused significant property and environmental damages to the park and limited recreational uses of the Black River for months. “This dam failure is a prime example of a disaster that could have been much worse. Had it not occurred in the winter, dozens of campers would likely have been killed; likewise, had it not occurred in the early morning hours, additional vehicles would likely have been on the highway that flooded. The Toops family and the two truckers swept from the road were extremely fortunate to have survived,” said Spragens. While the people caught in the flood have recovered from their injuries, Johnson’s Shut-Ins State Park suffered permanent environmental damages. In a settlement reached nearly two years after the failure, the dam owner agreed to pay $177.35 million to the State of Missouri for loss of tourism revenues and damages to park lands and natural resources.

(Ameren, 11/28/07).
Ameren incurred additional expenses rebuilding the dam, which now incorporates multiple redundant systems to ensure that a repeat of the overtopping event never occurs. “Dam maintenance and upgrades cost a lot,” said Spragens, “but they are much less expensive than cleanup, repairs, and restitution following a dam failure.”

Hydro:
(The most over-regulated power source.)
Hydro Dammed Up by Regulations
By William Tucker, December 4, 2015, realclearenergy.org

“I was talking with someone in the nuclear industry the other day and he said, ‘Gee, I didn’t realize you people were having the same problems we have.’ When it comes to getting through
the permit process, we’re not much different from nuclear.” So says Jeff Leahey, deputy executive director of the National Hydropower Association, the Washington lobbying group that supports the hydroelectric industry. NHA finds this particularly frustrating since it is in the midst of a revival that involves retrofitting existing dams with hydropower. “Hydro is handicapped by an outdated licensing process that lacks coordination between federal and state agencies,” says LeRoy Coleman, senior manager of communications at NHA. “The result is duplicate reviews, conflicting priorities and deferred decision-making that delays real environmental improvements. These roadblocks are pushing the licensing process for some plants to nearly a decade.”

Hydropower projects deal mainly with the Federal Energy Regulatory Commission (FERC), which has authority over all hydroelectric projects. But there are nearly half a dozen federal and state agencies that must be brought into the process as well. The National Fish and Wildlife Service, the Environmental Protection Agency plus various state agencies concerned with the environment and water courses have their hand in as well. “Under the status quo, state and federal resource agencies often fail to complete their important obligations under federal environmental laws within a reasonable timeframe,” says Coleman. “As a result, a proposed project can be rejected simply through an agency’s failure to make a decision. It may take ten years to get through the process.” This timeframe exists both for new hydroelectric dams and for retrofitting older ones to electricity, which is the Association’s main interest right now. “Under normal circumstances, the process takes about five years to complete,” says Leahey. “The average natural gas combined cycle plant takes only 18-24 months start to finish. Now compare ten years with 24 months. The uncertainty of the process is what makes it difficult for hydropower to attract investment.”

The delays are particularly frustrating since the industry believes it has enormous contribution to make in the search for clean power sources. Two years ago, Oak Ridge National Laboratory published a paper published noting that the U.S. has a potential of 12 gigawatts – that’s 12,000

Copy obtained from the National Performance of Dams Program: http://npdp.stanford.edu
megawatts – in existing dams that were not built for hydroelectricity. The Army Corps of Engineers and other federal agencies have been busy building these dams over the last 50 years. There are now 80,000 such sites around the country, yet only 3 percent of them are producing power. If fitted for electricity, the dams would provide enough juice to power over four million homes. "The common perception is that hydro in this country is pretty well tapped out because the growth curve over the last 20 years has been pretty flat," says Leahey. "But there's still enormous potential in dams that have already been constructed but haven't been outfitted for hydroelectricity. Now that the focus has turned to clean energy investment, we're seeing a revival of interest in hydropower."

The biggest source of potential is in the network of lock-and-lift dams build along the valleys of the Ohio, Mississippi, Alabama and Arkansas Rivers. The map published by Oak Ridge National Laboratory shows these river valleys virtually clogged with sites awaiting improvement. The ten top sites have the potential for 3 GW and the top 100 sites together could potentially provide 8 GW of renewable energy. Work has already begun on a few of these sites. Along the Ohio the Cannelton Dam in Indiana, the Smithland Dam in Livingston County, Kentucky and the Meldahl Dam in Braden County, Kentucky have already been retrofitted for 88 MW, 76 MW and 111 MW respectively. Two additional Army Corps of Engineer candidates for development are the Willow Island Dam in Pleasants County, West Virginia and the RC Byrd Dam in Gallipolis Ferry, West Virginia. They would provide 44 MW and 48 MW respectively. These projects have gone through the arduous review process. The Department of Energy says there are currently 331 dam sites going through the review process, including one for a 700 MW project in Alaska. The effort to improve these dam sites has not been evaluated from an economic point of view. "The analysis did not consider the economic feasibility of developing each unpowered facility," writes Boualem Hadjerioua, the principal investigator at Oak Ridge National Laboratory in a report titled “An Assessment of Energy Potential in Non-Powered Dams in the United States,” published two years ago. “The assessment provides preliminary information for stakeholders (such as developers, municipal planners, and policymakers) who can further evaluate the potential increase hydropower production at NPD sites.” But according to the National Hydropower Association, that potential is great and the economics are feasible.

There is one other factor that figures into the equation. Many environmental groups are currently touring the country campaigning to tear down existing dams. The Sierra Club managed to have a measure put on the ballot two years ago that would have torn down the Hetch-Hetchy Dam, which provides San Francisco with half its electricity and 2/3rds of its water. The referendum was soundly defeated. Such groups function better in court and before regulatory agencies, however. Is there any possibility that they may set up roadblocks to the retrofitting of existing dams? "For the most part we've been able to deal with them," says Leahey. "The environmental impact is already there with the construction of the dam so there's not too much at issue. In some cases we'll agree to the closing of one older dam if we can double the power output of another in the neighborhood. So it comes out pretty even." NHA is currently backing legislation in Congress that would put FERC in charge of all the permitting and try to speed up the process. As with nuclear, it is the glacial pace of the review process that is holding the industry back. If the news coming out of Paris is of any significance, there's much work to be done.

(While the other side opposes. Much of their shouting is not so.)

Don't Weaken River Protections at Hydropower Dams
By Jim Bradley, December 4th, 2015 | americanrivers.org

Earlier this week, the US House of Representatives voted to advance the hydropower industry's wish list bill, H.R. 8, the hydropower industry's so-called “Unlock Hydro” bill creates a giant loophole that allows
hydropower dam operators to avoid requirements to protect fish, wildlife and water quality. My colleagues and I are springing into action to fight this bill as it moves to the Senate. The industry and their allies in Congress claim that hydropower is "clean" energy. But if their idea for power rejects the Clean Water Act and Endangered Species Act, then I don't think you can call it clean, or responsible. It shouldn't come as a surprise that massive coal-fired utilities like Duke Energy and Southern Company are pushing this anti-environment bill. After all, hydropower companies own four of the top ten dirtiest power plants. The good news is that H.R. 8 passed the House on a narrow vote. And President Obama threatened to veto the bill [pdf] if it gets to his desk because the bill "would undercut bedrock environmental statutes, including the Clean Water Act, the National Environmental Policy Act, and the Endangered Species Act." However, we can't afford to let it get that far. My colleagues and I will not sit by while this happens. But to take on critical fights like this, we need you! The "Unlock Hydro" bill is outrageous. We need your help to stand up to the industry and to promote real clean energy – not a 19th century vision for the future of U.S. energy policy. If you agree, help us fight back. Thanks for standing with us to ensure our rivers, fish and wildlife are protected.

(Good investment.)

**Nashua to buy hydroelectric facility for $4.2 million**

By KIMBERLY HOUGHTON | Union Leader Correspondent, December 08, 2015, unionleader.com

NASHUA — The Board of Aldermen voted unanimously Tuesday to purchase the Mine Falls Park Hydroelectric Facility for $4.2 million. "Economically, it is far more beneficial to purchase this than not," said Ward 9 Alderman Ken Siegel. Nashua leases the power plant to Eagle Creek Renewable Energy LLC of New Jersey, however city officials agreed to issue a bond of up to $4.2 million to acquire the hydroelectric facility. The purchase is expected to take place by the end of the year. It has yet to be determined whether Nashua will operate the facility internally and use it to offset city electric use, sell the energy or hire an operator to run the facility and collect a percentage of the revenue. Aldermen could also opt to purchase the plant, make the necessary improvements and then place it on the market. Each of the options have different costs and revenues, according to a study conducted by H.L. Turner Group, a firm hired to assess the facility. There is an estimated $2,065,000 work in repairs that will need to be completed at the plant, according to the economic assessment study. However, the estimated net revenue in nine years ranges from $2.2 million to $3.7 million depending on what aldermen decide to do with the facility. "This is a no-brainer," Alderman Paul Chasse said of the acquisition. "It is in our financial best interest to purchase this now," agreed Alderman Dan Moriarty. Given the funding stream, Mayor Donnalee Lozeau said this is an ideal opportunity for the city to acquire the hydroelectric facility — a purchase that has been about 30 years in the making. Officials have a year to decide what to do with the future of the plant, she added. The facility has operated for about 30 years in Nashua, and has nine years remaining on its current Federal Energy Regulatory Commission license term.

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Copy obtained from the National Performance of Dams Program: [http://npdp.stanford.edu](http://npdp.stanford.edu)
The winds push us toward hydro

I'm sorry, but I looked again. We have in the Northwest something like four Seattle's worth of wind power capacity, a wondrous thing, but as of Wednesday afternoon it wasn't worth much. The Bonneville Power Administration website that posts power generation by source in real time (transmission.bpa.gov/business/operations/wind/baltwg.aspx) shows the Northwest's wind power bouncing from nothing to slightly more than nothing. It's been that way for nearly a week.

I've mentioned this before. That's not unusual, not this time of year. The wind does not blow and the turbines stand still. It's carbon-free non-energy, darkness in darkness. Tonight or tomorrow, weather permitting, the windmills may be ripping out 4,000 megawatts. Who knows?

Therein lies the problem. There are many influential and powerful people, some now meeting in Paris to plan our energy future, who insist that we can move to carbon-free energy production and save the planet with existing renewable technology, and by that they mean wind and solar. There are others, the realists, who say that will never happen. Windmills are great, says Bill Gates, but you can't build them fast enough.

James Hansen, the godfather of climate science, was paraphrased by the Huffington Post on the topic: “The idea that clean energy can scale up fast enough to replace fossil fuels is so naïve, he says, that we might as well believe in the Easter bunny and the tooth fairy.”

The core difficulty is seen on that BPA website. We can't build an economy on a power source that can shut off or go full blast and we never know when. You can't shut everything down at dusk when the solar panels stop producing. If the wind doesn't blow, it doesn't matter how many windmills you have. Keep that in mind when they tell you, and they will, that we need many, many more.

So, how fortunate we are to have hydroelectricity, that massive source of fairly reliable only somewhat seasonal carbon-free and wonderfully inexpensive electricity. As the impacts of climate change get more and more fretful and the world seeks solutions that are remotely practical, hydropower is setting more notice for — yes, you can say it — its environmental benefits. They have noticed that hydroelectric dams produce about 7 percent of U.S. electricity. If you count hydropower as renewable, as any sensible person would, you would know that it provides more than half our renewable energy, more than any other source, even when the wind blows.

Contrary to popular belief, there is more hydropower to be had. You don't have to build more dams and block more streams, you just have to fit turbines on the dams already built. Julian Spector from The Atlantic last week wrote about a Department of Energy hydropower study we reported on in 2013. More than 90 percent of existing dams in the United States make no power. The DOE study identified 12 gigawatts of new hydropower available by retrofitting existing dams, he said. Wrote James Conca in Forbes: “If we are to achieve any of the low-carbon goals we have set out for 2030 and beyond, hydropower must increase significantly and nuclear has to maintain its share of power, and even increase slightly by 2030.”

We know from local experience that hydropower is regulated to an almost unimaginable degree. The Federal Energy Regulatory Commission is immensely powerful. The hoops it demands we jump through are so numerous it requires years and millions to run the course. There are reforms proposed in Congress, and those who oppose them. But if hydropower is to be tapped to the degree we urgently need, the legislative winds must blow. We need carbon-free power. If you can get more of it faster by revising rules, let us do it.

Tracy Warner's column appears Wednesday through Friday. Reach him at 509-665-1163 or warner@wenatcheeworld.com.
(Taking one bad example and painting all hydro bad is poor reporting.)

**Damn Dams — The Dirty Secret of Hydropower**

*No Secret to the Lives it Destroys*

Hydropower, often viewed as an “environmentally friendly” source of energy, is neither clean nor green. Activists say hydropower devastates lives, destroys rivers, produces methane which contributes to global warming, and fuels corruption. In fact, the only thing green about it is the money it earns for the few. These activists, via a broad coalition of groups, are urging world leaders in Paris today to withdraw their support — and funding — from major dam-building projects.

“Particularly in tropical regions, hydropower reservoirs emit significant amounts of greenhouse gases, comparable to the climate impact of the aviation sector,” said Peter Bosshard, interim Executive Director of International Rivers. “For environmental, social and economic reasons, large hydropower projects are a false solution to climate change.” Besides wrecking the environment, the dams often devastate local populations, according to the coalition, which also represents indigenous people. Rivers are the lifeline of these people. Watching a sparkling river, running wild and free, then trapped by dam builders, is a little bit like seeing a magnificent elephant taken down by poachers. It is heart-breaking. The activist groups have released a powerful video that details the many dangers of major hydropower projects.

(There’s nothing better than free money.)

**Tanacross hydropower project nets $500K federal grant**

*By Robert Hannon, KUAC - Fairbanks | December 7, 2015, alaskapublic.org*

A small hydropower project near Tanacross is one step closer to fruition after receiving a half-million dollar federal grant. The Yerrick Creek Natural Energy Project aims to use renewable energy to replace thousands of gallons a year of diesel fuel used by the region. Alaska Power and Telephone is partnering with the Village of Tanacross and the local Native corporation to build a small hydropower project on the Yerrick Creek. Because the project lies on Native and state-owned lands, project Manager Jason Custer says the company has sidestep expensive and time consuming federal permitting. Custer says the recent $500,000 federal grant will pay for power house equipment.

The company’s received other federal and state grants, but more are needed, he says, if the project wants to reach the nearly $20 million cost. "We can’t do the project with just with private debt and equity alone. There’s also a need for grants to help drive the cost of power down.” Custer explains the project needs to demonstrate it can supply power more economically than the current cost of diesel fuel that powers the community today. Once the 1.5 megawatt project is up and running, he estimates it should cover 40 percent of the power needs of Tok, Tanacross,
Tetlin, and Dot Lake for the next 50 to 100 years. “Right now those communities are 100 percent dependent on diesel-based generation of electricity,” he explains. “So this would be the first time they have access to renewable energy.” Custer says the region currently uses almost 400,000 gallons of diesel fuel a year. He hopes lawmakers see any loan to the project will be offset by lower rural power subsidies.

(All they need now is rain.)

**Merced River hydro relicensing Environmental Impact Statement released**

By Todd Griset, | PretiFlaherty, jdsupra.com

Staff of the Federal Energy Regulatory Commission have released a final Environmental Impact Statement (EIS) evaluating proposals to relicense two hydroelectric power projects located on the Merced River in California. The two projects are Merced Irrigation District’s existing 101.25 megawatt Merced River Project No. 2179-043, and Pacific Gas and Electric Company’s (PG&E) existing 3.4-MW Merced Falls Project No. 2467-020. Prepared as part of the relicensing process for those projects, the Merced River EIS contains FERC staff evaluations of the applicants’ proposals and the alternatives for relicensing the Merced River and Merced Falls Hydroelectric Projects. The staff’s recommendation is to relicense the project as proposed, with certain modifications, and additional measures recommended by the agencies.

The Federal Energy Regulatory Commission is authorized by the Federal Power Act to issue licenses for up to 50 years for the construction and operation of nonfederal hydroelectric development subject to its jurisdiction, on condition:

*That the project adopted…shall be such as in the judgment of the Commission will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce, for the improvement and utilization of water-power development, for the adequate protection, mitigation, and enhancement of fish and wildlife (including related spawning grounds and habitat), and for other beneficial public uses, including irrigation, flood control, water supply, and recreational and other purposes referred to in section 4(e)…*

The Commission may also require such other conditions not inconsistent with the FPA as may be found necessary to provide for the various public interests to be served by the project. To assist in this evaluation, and as required by the National Environmental Policy Act, FERC staff prepares the EIS. It is designed to record the view of governmental agencies, non-governmental organizations, affected Indian tribes, the public, the license applicants, and FERC staff. In the Merced River cases, the licensees used FERC’s Integrated Licensing Process (ILP) and filed relicensing applications in February 2012. FERC elected to process the applications for the two projects together “because they: (1) are located contiguously on the Merced River; (2) the Merced Falls Project’s operation depends entirely on flows released by the upstream Merced River Project; and (3) downstream of the Merced River Project, the environmental effects of both projects are interrelated.”

Each applicant proposed some modified environmental measures in its license application, but no new capacity and no new construction at the project. In the Merced projects’ 840-page final EIS, Commission staff noted that the “primary issues associated with relicensing the projects are flow regimes in project-affected reaches for aquatic resources, project effects on physical habitat for aquatic resources, protection of wildlife resources, recreation enhancements, and protection of
cultural resources.” After consideration, Commission staff recommended the staff alternative, which consists of measures included in Merced ID’s and PG&E’s proposals, as well as some of the mandatory conditions and recommendations made by other state and federal agencies and non-governmental organizations, plus additional measures developed by FERC staff:

We chose the staff alternative as the preferred alternative because: (1) the projects would provide a dependable source of electrical energy for the region; (2) the generation comes from a renewable resource that does not contribute to atmospheric pollution, including greenhouse gases; and (3) the recommended environmental measures proposed by Merced ID and PG&E, as modified by staff, would adequately protect and enhance environmental resources affected by the projects. The overall benefits of the staff alternatives would be worth the cost of the environmental measures.

Ultimately, the Merced River hydropower relicensing project EIS concludes that "issuing new licenses for the Merced River and Merced Falls Projects, with the environmental measures we recommend, would not be major federal actions significantly affecting the quality of the human environment."

(100 years and still ticking.)

A century of power at Lookout Shoals
Facility marks 100 years
By Jonathan Weaver, Dec 8, 2015, statesville.com

Story goes that during construction of the Lookout Shoals dam in 1914, young ladies from the area would come by the building site to check out the guys working on the crews. It was there Walter Sipes met his future bride, and thus began four generations of Sipes with connections to the 100-year-old dam. Walter's grandson, Foy Sipes, told of his family's history to a group that included current and past plant workers Tuesday during the 100th anniversary of the hydroelectric facility. Foy Sipes, an instrument and control technician, has worked at the plant since 1974. His father worked there in the '60s and early '70s, and his son now works in Duke Energy's control center. Foy Sipes talked about the importance of the plant in the community. He recalled the locals lining up to take showers and fill water jugs during Hurricane Hugo in late 1989.

Opened in 1915, the Lookout Shoals plant has for 100 years been a “key piece of our economy,” said Randy Herrin, general manager of the hydroelectric fleet. Early on, the plant was instrumental in the area’s textile and tobacco industries, Herrin said. Today, a small percentage is used to generate electricity, but Lookout Shoals and Duke Energy’s other hydro plants supply “peak time” power when electricity is needed most. The plants can begin to generate electricity in minutes, according to Lisa Parrish, Duke Energy government and community relations manager. Lookout Shoals has three generating units with a capacity of 26 megawatts. It is one of 13 hydroelectric plants and 11 reservoirs operated by Duke Energy along the Catawba-Wateree River in the Carolinas. Just last month, the Federal Energy Regulatory Commission issued a new 40-year operating license from the Federal Energy Regulatory Commission. The license means that “the Catawba-Wateree River will continue to support and sustain communities across the Carolinas for at least the next 40 years,” said Steve Jester, Duke Energy’s vice president of water strategy, hydro licensing and lake services. Tuesday’s celebration served as a homecoming for many who have worked at the dam, including Sam Powell, who spent 40 years with Duke Energy and worked at Lookout Shoals from 1993 to 2010, he said. Powell said when he first

Copy obtained from the National Performance of Dams Program: http://npdp.stanford.edu
started at Lookout Shoals, a full staff that worked the area around the clock. Now the operations are monitored remotely and Lookout Shoals has two staff members. "A lot of things have changed over the years in the operation, but it still does the same job it always has," Powell said of the dam.

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Lookout Shoals facts
- The Southern Power Company originally acquired the real estate and water rights in 1909.
- Duke Power Company merged with Southern Power Company in 1927 and assumed control of the plant.
- The plant consists of an earth embankment section, two concrete gravity overflow sections, a concrete gravity overflow spillway section, and a concrete intake and powerhouse section.
- The total length of the dam and all accompanying structures is 2,750 feet. The concrete gravity spillway section is 933 feet long.
- Lookout Shoals Lake was formed in 1915 with the construction of the hydroelectric station. The lake has about 1,305 acres of surface area and 37 miles of shoreline.
- Full pond elevation of Lookout Shoals Lake is 838.1 feet.
- The Catawba-Wateree River supplies drinking water for nearly 2 million people.
- More than 10 million residents and visitors use the recreation access areas in the Catawba-Wateree Hydroelectric Project.

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(Water: (Here’s an idea!)

**Why Storing Water for the Future Means Looking Underground**

Conventional dams and reservoirs work against nature. It's time to work with it.

By Laura Bliss, Dec 9, 2015, citylab.com

Whatever the conclusion of COP21, adapting to climate change will only become more urgent, as its impacts become harsher. These impacts are, and will be, felt primarily through water: rising sea-levels, dwindling snowpack, droughts, and floods. As countries all over the world grapple with these challenges, there’s been a lot of talk about innovative water-saving approaches, such as desalination, recycling, novel irrigation systems for farmers, and conservation tools for homes. But there’s another variable in the equation when it comes to adapting water use to climate change, and that’s storage—how we hold onto water when it’s available, so that supplies meet demand in unsteady times.

More big dams? Building more dams and reservoirs is probably the first solution that comes to mind. Especially in the last century, they’ve been the primary way that the U.S.—and many other countries like China, India, and South Africa—have collected water. By providing a steady stream of water and electricity to cities and farmers, dams and reservoirs have buttressed economic and population growth all over the world.

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But that’s once they’re already built. Penning up rivers for human gain comes at tremendous costs. Dams interfere with the natural direction of waterbodies and often devastate the wildlife dependent on those flow. And especially when compared to their enormous financial burden, the capacity of dams to supply humans with water is often pretty limited.

For example, in California, home to 1,400 regulated reservoirs, some $2.7 billion in drought emergency bond money has been earmarked for water storage development. Should the state build even more dams, as some elected officials insist? Besides the fact that all the best spots for damming are taken, the math just doesn’t add up, according to a recent report by the Public Policy Institute of California (PPIC), a non-partisan think tank:

*Five proposed projects — costing roughly $9 billion — would expand statewide reservoir capacity by about four million acre-feet. However, these projects would raise annual average supplies by 410,000 acre-feet, or just one percent of annual farm and city use.*

There are lots of reasons dams are inefficient at getting humans water. Reservoirs have to leave lots of room empty in case of floods. Large portions of banked water have to be dedicated to environmental purposes (at least in the U.S.). And still more water has to be guarded for use during droughts, during which times those stores can be quickly depleted. On top of all that, a recent study in Science shows that humans have been underestimating global water consumption by about 20 percent, largely due to the rate of evapotranspiration—evaporation and water taken up by plants—in dams and irrigation structures.

Not all dams are necessarily bad ideas, though. "Small dams can slow down rivers that are swollen from a heavy rain, hold back the water, and allow it to soak into the soil," writes Brett Walton at water news site Circle of Blue. Existing dams can also be enlarged or renovated to boost supply. Overall, though, there are a lot of good reasons that the U.S. has been increasingly shy about building big dams in the past few decades.

**Looking to the ground**

*When it comes to storage options, then, the smart money is on groundwater.* To use California as an example again, its groundwater basins store at least three times as much usable water as manmade reservoirs, according to the PPIC. During the state’s historic drought, those groundwater supplies have dwindled to dangerously low levels, even causing parts of the state to physically subside. Sadly, California’s not unique; a 2015 study by UC Irvine researchers revealed that supplies in 21 of the world’s 37 largest aquifers have fallen off since 2003. And the severe depletion of about a third of them is threatening regional water availability. Fortunately, these threats are forcing people to dream up ways to recharge groundwater supplies. The concept of groundwater banking—directing stormwater and excess dam flow towards earthen complexes, designed to percolate water back to the aquifer—is gathering steam across the U.S. and beyond. To go back to California, that $2.7 billion water storage bond could get six times the water storage capacity if the state used it for groundwater projects rather than for new dams and reservoirs.

Restocking groundwater supplies has its drawbacks. Letting water percolate to the ground, and drawing it back up when needed, is simply a slower process than a reservoir’s speedy fill and release cycle. It’s also harder to regulate. "You got to be damn sure somebody else hasn’t dropped a straw" into below-ground reserves, Jeffrey Mount, a senior fellow at the PPIC, told the L.A. Times.

Still, the low costs and high gains of groundwater recharge make it one of the most promising answers to the question of global water storage. Some scientists are even calling on leaders at

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*Copy obtained from the National Performance of Dams Program: [http://npdp.stanford.edu](http://npdp.stanford.edu)*
COP21 to include groundwater in their universal agreement. “Local managers do not necessarily have the tools for managing groundwater,” Jason Gurdak, a hydrologist at San Francisco State University, told Circle of Blue. “They lack financing to build projects and they lack programs to develop technical knowledge. There has to be leadership at the global level.”

Perhaps best of all, recharging existing aquifers means working with nature’s infrastructure, not building on top of it. “The mighty waters of the Colorado were running unused to the sea,” said President Franklin Delano Roosevelt in his dedication speech at Hoover Dam in 1935. “Today we translate them into a great national possession.” Eighty years later, the world is on the brink of climate change catastrophe. Policymakers had better learn not to try and “possess” natural resources as essential as water—but work with them instead.

Environment:
Fish ladder planned at Bend dam aims to unite two redband trout populations
By The Associated Press, DEC 10, 2015, registerguard.com

BEND, OR — A fish ladder set to be built at a Bend dam is expected to unite populations of redband trout that have lived separately for more than a century. Upper Deschutes Watershed Council Executive Director Ryan Houston says the fish populations that can be found upstream and downstream of the North Canal Dam need to intermix to maintain healthy populations, the Bend Bulletin reports. The 6-foot-wide and 5-foot-high fish ladder will be made out of stainless steel and will be on the east side of the canyon. Houston says the project will cost more than $1.6 million. It is being funded by a grant from the state Watershed Enhancement Board, funds from the Oregon Department of Fish and Wildlife and three irrigation districts that use the dam.
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