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November 1, 2020

Water, Pollution & the Web of Life



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We live in an era marked by ecocide and mass extinction events. Whether deliberate or negligent, human action is destroying natural environments, including those which people inhabit. Nevertheless, people are proving again and again that it is possible to reimagine sustainable resource use, often combining ancient and modern practices. The resulting environmental and human health co-benefits are extraordinarily beneficial, and urgently required.

This month, we explore some of the ways in which water and ecosystems connect and make life viable, as well as the impacts of pollution and climate change. We highlight a variety of problems and solutions being implemented in Iowa to monitor water quality; seek legal remedies to pollution; ensure food security; restore, rebuild and rewild ecosystems; as well as create climate resilience



NASA Video | Earth's Water Cycle |
How much fresh water is there, and where is it?

"Oceans, in effect, mimic some functions of the human circulatory system. Just as arteries carry oxygenated blood from the heart to the extremities, and veins return blood to be replenished with oxygen, oceans provide life-sustaining circulation to the planet."

Daniel Glick ["The Big Thaw"](#) National Geographic

Melting Glaciers and Ice Sheets

75% of Earth's freshwater is frozen. Climate change accelerates the melting of ice sheets and glaciers, resulting in sea level rise. This alters the salinity and temperature of ocean water which, in turn, affects long-established ocean currents and ecosystems.

The [global ocean conveyor belt](#) is a constantly moving system of deep-ocean circulation driven by temperature and salinity.

National Oceanic and Atmospheric Administration (NOAA)



The health of our oceans is critical to life on this planet. At the moment, our oceans are absorbing between one-quarter and one-third of man-made carbon dioxide (CO₂) emissions which, whilst helping to mitigate global warming, is leading to increased ocean acidification. This has significant impacts on ocean life, for example, dissolving the calcium carbonate in coral skeletons and mussel shells, and interrupting the processes by which fish breathe. Additionally, scientists say that this rate of absorption will at some point diminish.

Many people have long depended on glaciers as sources of freshwater. Now, that security is diminishing. Lives and livelihoods are being upended, from fisheries in the Gulf of Mexico to villages in the foothills of the Himalayas, and it's going to take significant intervention if we are to mitigate and adapt to the human and environmental impacts of ice and glacier loss.

Conservation, Restoration and Rewilding

Restoring balance to our oceans and other ecosystems on Earth necessarily requires us to be climate-conscious and work together locally and globally to reverse global

warming/climate change. The planet's web of ecosystems is too vast to fully represent here, but suffice it to say they are interconnected to the extent that the collapse of one system weakens others. Also, the revival of an ecosystem positively impacts surrounding systems.

Pleistocene Park, Siberia

Russia's Pleistocene Park is a nature reserve in northeastern Siberia with a difference. Rather than merely trying to protect the environment as it is, a project is underway to restore the Siberian grasslands back to the way it was during the Pleistocene era, when huge numbers of megafauna roamed what is now known as the Mammoth Steppe ecosystem.

The driving force behind the project is Sergey Zimov, a scientist dedicated to showing the world that rewilding nature is not only something not to be feared, but a necessary strategy to ensure human survival on Earth. Established in 1996, the park has successfully reintroduced a range of animals, such as Bison, Musk Oxen, and Horses, whose ancestors once heavily populated the area. In doing so, they have transformed the ecosystem into a rich, dynamic, biodiversity filled oasis they hope and expect to grow in size naturally as megafauna populations increase and spread.

The Siberian grasslands are a huge reservoir of carbon, with soil in places a mile deep thanks to the historic sequestration capacities of wild grassland ecosystems. They also contain a lot of methane, a greenhouse gas 80 times more potent than carbon dioxide at trapping the Sun's heat. Keeping this carbon and methane in the permafrost is vital if we are to avoid catastrophic global warming, and through the trampling of snow and trees, large herbivores can play a vital, and cheap, role in mitigating and reversing the impacts of warming on the permafrost.

Reaching a point where the Mammoth Steppe ecosystem of old can naturally mitigate permafrost loss and methane emissions in the time we have left (the arctic is the fastest warming region in the world) will require human intervention, not mere protection from human activity. As Sergey Zimov says, "What is the point of protecting nature if there is little to protect? We have to help repair first, then protect."

The ultimate aim of the park is to provide a proof of concept that will encourage the rewilding of grasslands all over the world, including here in Iowa, to restore biodiversity, resilience and carbon sequestration capacity to ecosystems that used to dominate swathes of this planet, and can again.. The first part of the project - demonstrating its efficacy and viability - is now complete, according to Zimov, leaving the hard part still to come: a change in culture, in people's mindsets, from fearing the wild and seeking to profit from its destruction to recognising the myriad of benefits of, nevermind the existential need for, sustainable, biodiverse, and carbon negative ecosystems. Iowa needs to learn some of these lessons, and mimic some of Zimov's practices.

Midwestern Prairies



"The land [of the loway] was delineated by the rivers, especially the two great rivers, Nyitanga (the Mississippi) and Nyishuje (the Missouri), the life's blood of the Earth... Between these two rivers lay the lands the loway claimed as their own, threaded with other rivers, and marked by glacial hills, marshes, tall grass prairies, and ancient woodlands."

[Lance Michael Foster](#) MA, MLA
Iowa Tribe of Kansas & Nebraska

Drawing by Lance Foster (2003)

The non-native settlement of the American Great Plains was deadly for most local native peoples and ecosystems in the region. Eventually, the Euro-American settlement wiped out the majority of prairielands, wetlands and woodlands. Waterways that had once been sustainably utilized have since become sickened by water pollution.

The prairies that covered Iowa efficiently captured precipitation which filtered down to underground aquifers. Since the prairies were converted into farm fields, sediment has become a major water pollutant in Iowa and downstream. The loss of fertile topsoil has led to the use of chemical fertilizers, which also pollute our waters.

Prairie ecosystems are very climate resilient. The prairie plants, both above and below ground, are built to withstand extreme weather. Every winter, the death of foliage above ground replenishes the soil. Prairies can also rapidly regenerate after severe drought and even fire. Another superpower that prairies possess is their ability to sequester large amounts of carbon from the atmosphere and retain it in the soil, helping combat climate change.

Iowa only has a few small remnants of native prairie. Prairie conservation, restoration and rebuilding practices are gaining traction in our state. They simultaneously protect water and soil, while simultaneously enhancing biodiversity and sequestering carbon.

It is more popular now to plant "pollinator gardens" with native prairie plants on public and private lands. Importantly, Iowa farmers are now encouraged to plant strips of prairie in their fields as a conservation practice to protect soil and water while providing habitat for wildlife. Iowa State University [research](#) also shows that adding prairie strips is one of the most affordable and environmentally beneficial agricultural conservation practices available.



The Iowa Department of Natural Resources (DNR) has dedicated three full-time employees to producing prairie grass and wildflower seed for restoring a portion of Iowa's public lands to prairie. The Iowa DNR [Prairie Resource Center](#) provides over 65 species of Iowa-origin prairie grasses and wildflowers to public land managers across the state.

Iowa Nutrient Pollution and Algal Blooms

"Iowa's world-famous soils are packed with nitrogen – a gift from nature that allowed commercial agriculture to take root here – but decades of adding synthetic fertilisers and animal manure to drive production has loaded the land with nutrients it can't hold on to. Crop production in Iowa is still the main source, but animal manure from the state's 20 million pigs has contributed to the problem."

Source: [The Guardian](#)

Iowa has high concentrations of nitrogen and phosphorus in our water due to agricultural runoff, phosphate-based detergents, etc. They accelerate the growth of aquatic plant-life, particularly algae. Nitrates starve the body of oxygen. High nitrate levels in drinking water pose severe health risks, especially to babies.

Blue-green algae naturally exist in low numbers in lakes and streams. Excessive algal blooms form thick mats on water surfaces, particularly ponds and lakes. They deplete the oxygen in the water and block sunlight from reaching fish and plants; as a result, aquatic plants die and fish starve. Their toxic byproduct, microcystin, poses serious health concerns for humans, wildlife, livestock and pets.

Exposure to high levels of microcystin can cause gastrointestinal problems, asthma-like symptoms, skin irritation (rashes), as well as kidney and liver damage. Health care providers in Iowa are required to report suspected and confirmed cases of exposure to blue green algae (microcystin poisoning) to Iowa Department of Public Health, specifically cases that meet one or more of the following criteria:

- Gastrointestinal symptoms
- Respiratory symptoms
- Dermal symptoms
- Elevated serum GGT (gamma glutamyl transpeptidase)
- A history of exposure within the past seven days to water testing positive for microcystin

Iowa's municipalities struggle to provide the extra water treatment required to make it safe. This summer, Des Moines Water Works characterized the Des Moines River as "essentially unusable" as a drinking water source for 500,000 central Iowans due to microcystin levels at ten times above the federally recommended limit.

Bacterial contamination in water such as *E. Coli* is another major health concern, stemming primarily from Confined Animal Feeding Operations (CAFOs) and the animal waste they produce. The Iowa Environmental Council (IEC) worryingly notes that 2020 saw an 87% increase in *E. Coli* advisories (112 in total) in Iowa since 2019. Unless something drastic is done to reduce water pollution, especially from animal waste, and agricultural runoff, Iowa's waterways will continue to pose serious health threats.

Physicians for Social Responsibility (PSR) Iowa, along with the IEC, advocate for reduced agricultural pollution, the implementation and enforcement of the Clean Water Act, and increased funding for natural resource conservation. We also support restoring the functions of a well provisioned Iowa DNR to monitor Iowa's waterways for pollution, and provide Iowans with weekly updates and advisories on *E. Coli* and Microcystin.

We must support efforts to see the state's Nutrient Reduction Strategy (NRS) significantly strengthened, The NRS must include a timeline for a serious reduction in agricultural nutrient runoff, benchmarks for success, transparent monitoring and recording, mandatory conservation planning for all stakeholders (including farmers), and the suspension of new or expanded CAFOs).

Steps We Can Take To Protect Our Water

If we ask ourselves each day, "What have I done for the water today?" I believe we can create a bold and brilliant world — where future generations are able to form the same relationship to water that we have been privileged to have, where all communities of human and non-human relations have water to live, because water is life.

— [Kelsey Leonard](#) MSc., JD, Shinnecock Indian Nation

- Use phosphate-free dishwasher detergents. Phosphates feed harmful algal blooms.
- Keep unused medications out of our water by safe and responsible disposal. Many common medications are harmful to water, so they should not be poured down the drain, or flushed down the toilet.
 - Unexpired and unopened medications can be donated to a statewide program developed and administered by the Iowa Department of Public Health and the [SafeNetRx program](#).
 - Leftover medications can be returned to the pharmacy or taken to a designated disposal repository. [Find one near you](#).
- Advocate for improving health and biodiversity through banning the application of chemicals to gardens, lawns and farms.
- Request and rally government support for alternative farming practices that do not require the application of synthetic fertilizers, so we reduce CO2 emissions, as well as nitrogen and phosphorus contaminating our water.
- Get to know about water-related issues in your area.
- Learn how communities can come together to reduce flood risk and improve water quality by forming a [Watershed Management Authority](#).
- Advocate for healthy and sustainable water practices:
 - Speak to your city administrators and elected representatives.
 - Attend city council meetings.
 - Write letters to local newspaper editors.
 - Organize water protection demonstrations.

Learn More

["Research: the deep sea is slowly warming"](#) (October 14, 2020) NOAA

["Taking our Fight for Clean Water to the Courts"](#) (October 2, 2020) *Iowa Citizens for Community Improvement*

["Prairie Rivers of Iowa and Story County Organizing 10-Year Water Quality Monitoring Effort"](#) (September 25, 2020) *Prairie Rivers of Iowa*

["The High Cost of Algae Blooms in U.S. Waters: More Than \\$1 Billion in 10 Years"](#) (August 26, 2020) *Environmental Working Group*

["Kelsey Leonard: How Did We Lose Our Connection To Water?"](#) (August 7, 2020) *Iowa Public Radio News*

["Humans have altered North America's ecosystems more than melting glaciers"](#) (August 5, 2020) *Science Magazine*

["Ames council recommends new name for Squaw Creek"](#) (January 30, 2020) *Des Moines Register*

["Ag-Gag Laws Are Unconstitutional But Iowa Sure Keeps Trying"](#) (June 29, 2020) *Food and Water Watch*

["Iowa Has a New Food Operation Trespass Law"](#) (June 22, 2020) *Center for Agricultural Law and Taxation, Iowa State University*

["Iowa quietly passes its third ag-gag bill after constitutional challenges"](#) (June 10, 2020) *The Intercept*

["Meaty History in 'Capitalist Pigs'"](#) (April 5, 2020) *Iowa Department of Cultural Affairs*

["Controversial 'Ag Gag' bill considered in Iowa"](#) (February 1, 2020) *Pesticide Action Network*

["Iowa's Water Quality Continues to Decline"](#) (December 4, 2020) *Food & Water Watch*

["What they put on the fields contaminates our water": Iowa's pollution problem"](#) (September 26, 2019) *The Guardian*

["The Slow Reality of the Nutrient Reduction Strategy"](#) (July 20, 2019) *Iowa Environmental Council*

["Planting Native Prairie Could Be a Secret Weapon for Farmers"](#) (April 15, 2019) *Civil Eats*

["Native Shrubs and Why They're Essential for Carbon Sequestration"](#) (January 2, 2019) *Resilience*

["Tanji na Che: Recovering the Landscape of the Ioway"](#) (1999) *University of Wisconsin Press*

["The Ioway and the Landscape of Southeast Iowa"](#) (1996) *Journal of the Iowa Archeological Society*

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