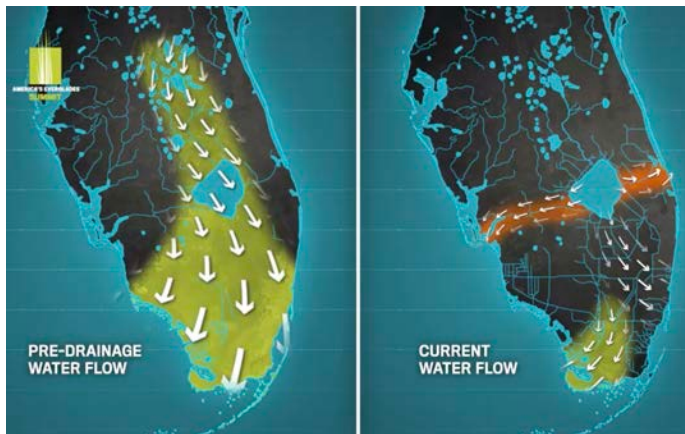
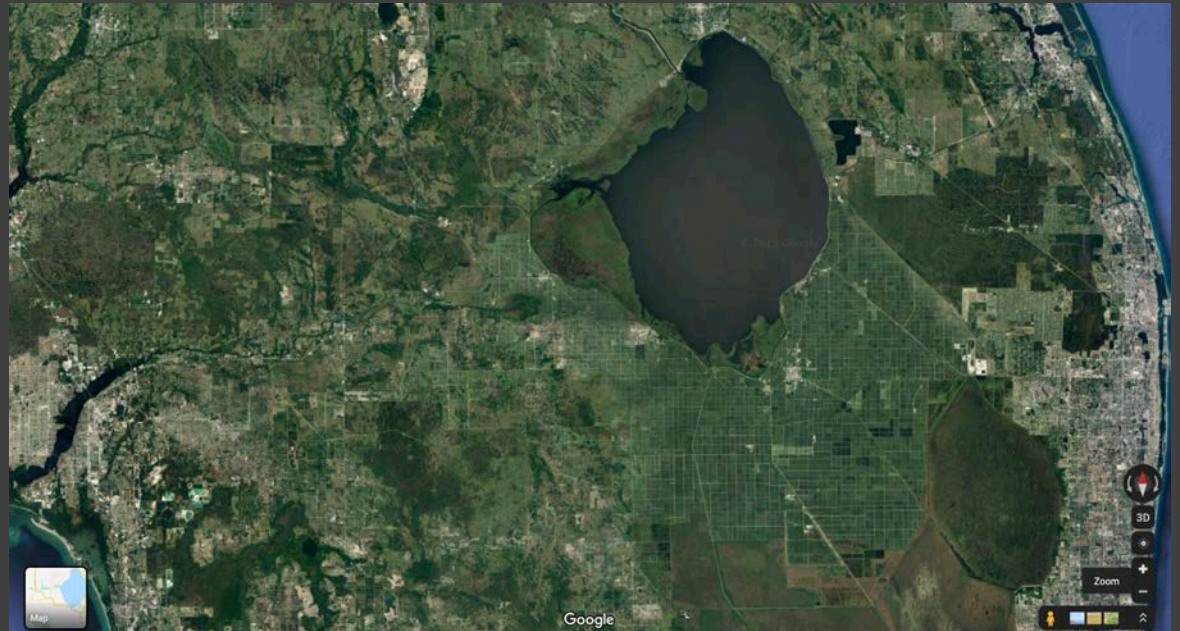
An aerial photograph of Lake Okeechobee and the Everglades. The water is a dark, murky green, and the surrounding land is a lighter, brownish-green. The text is overlaid in the center of the image.

Lake Okeechobee & the Everglades:
A story of conflicting agendas, bad planning,
terrible priorities, even worse management.



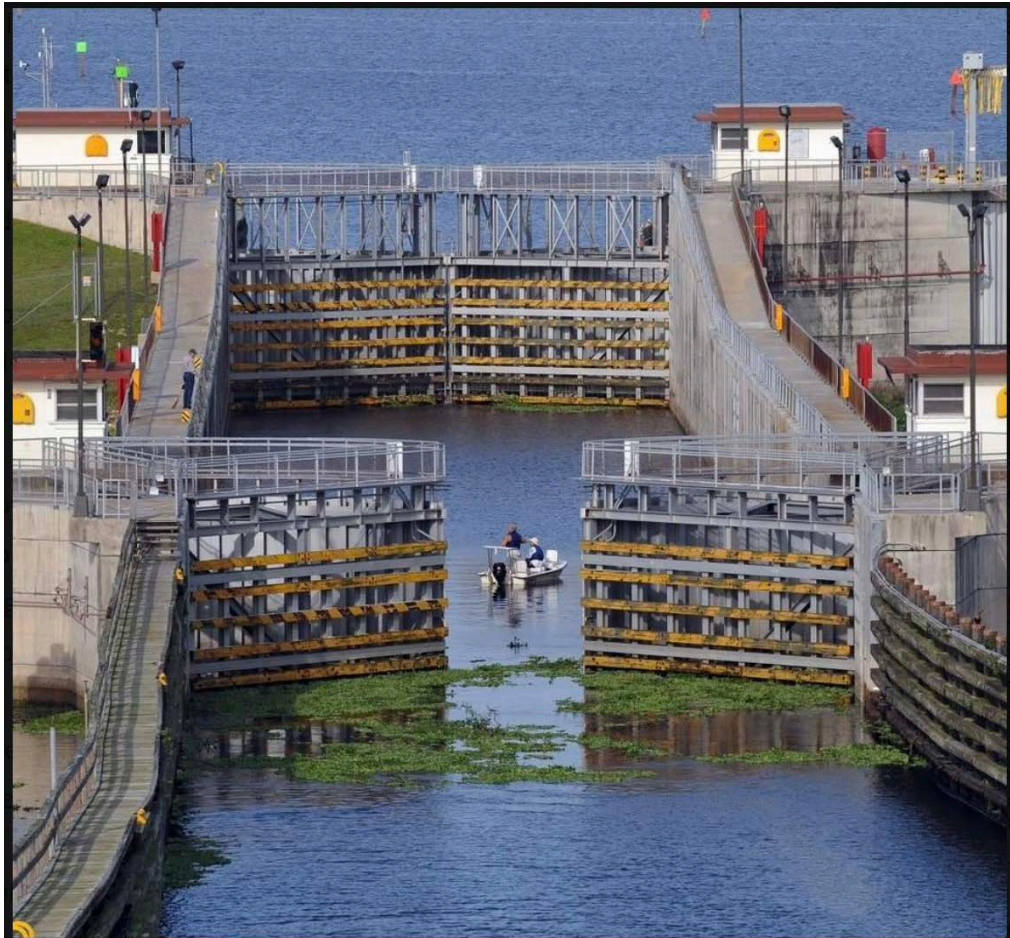
Long ago, life-sustaining lake waters naturally overlapped Lake Okeechobee's shores and flowed south, down through the "River of Grass" we call the Everglades.

Unbridled growth, bad planning, a lack of political will, and poor management has turned Lake O's water into a deadly mix of fertilizer, sewerage and agricultural runoff.



South Florida's engineered drainage and holding systems artificially redirect water to protect the homes, schools, businesses and a massive sea of sugar cane that now occupies what used to be the Everglades.


WHAT PROBLEMS ARE THE DISCHARGES EAST & WEST CAUSING?



When Lake Okeechobee gets higher than federally-regulated levels (which vary by season), the U.S. Army Corps of Engineers releases excess water through locks like this one at Port Mayaca.

Credit Joe Rimkus Jr. / Miami Herald

In the last 20 or 30 years, red tide was an event that was around for a weekend or a week. Now it's around for months at a time.

 Red tide is back off the coast of Florida. Residents aren't sure how much more they can take

November 12, 2019

Florida's largest industry, tourism, added \$111.7 billion to the state's economy in 2016.

The "Sunshine state's" tourism economy depends on clean beaches and clear water for its economic survival.

A photograph showing a dense mangrove forest with many trees and their roots. In the background, a boat with several people is visible on a narrow waterway. The scene is lush and green.


The NPS estimates that the Everglades generated \$104.5 million in economic benefits in 2014.*

The wetlands are a major tourist destination, but they are fragile. The consequence of Florida's development boomed over the last century has drained more than half the original 4 million acres of the Everglades and reduced water flow by more than two thirds.

It is estimated that \$11.5 billion should be spent to restore this wetland.

Restoration would result in a \$46.5 billion boost to the Florida economy, along with ensuring cleaner water and improved natural habitat.

* <https://www.nps.gov/ever/learn/news/tourism-to-everglades-national-park-creates-104-million-in-economic-benefits.htm>

An aerial photograph of a nuclear power plant. In the foreground, a large, white, cylindrical containment dome is visible, surrounded by a parking lot filled with cars. In the background, there are several industrial buildings and a large plume of white steam rising from the facility. The image is partially obscured by a dark, semi-transparent overlay on the left side.

That restoration cost is roughly equivalent to the cost of two nuclear reactors.

But the returns are enough to pay college tuition for $\frac{1}{2}$ million FGCU students

(or buy 5,000 large Caribbean islands)

(or buy more than 6 billion Big Mac Combos)

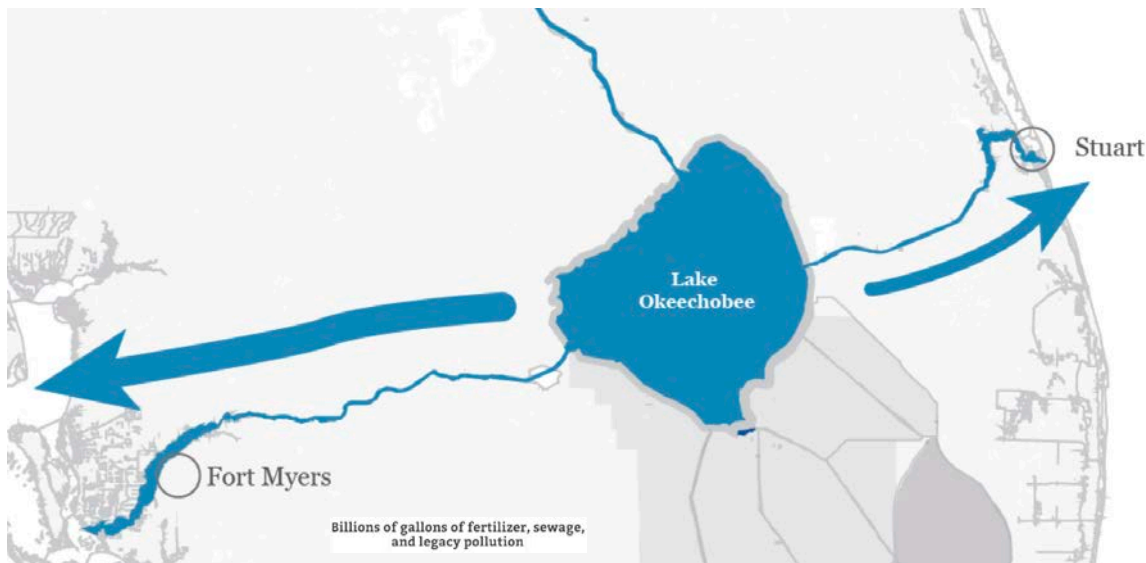
COMPARE THIS COST to what the federal and state governments are paying for now - a \$16 billion project to resuscitate the dying Everglades, just part of the costs to bear for the build-out of the Florida dream (sprawl).

As the climate changes, Florida is receiving rainier winters and springs, which trigger more frequent lake-draining emergencies.

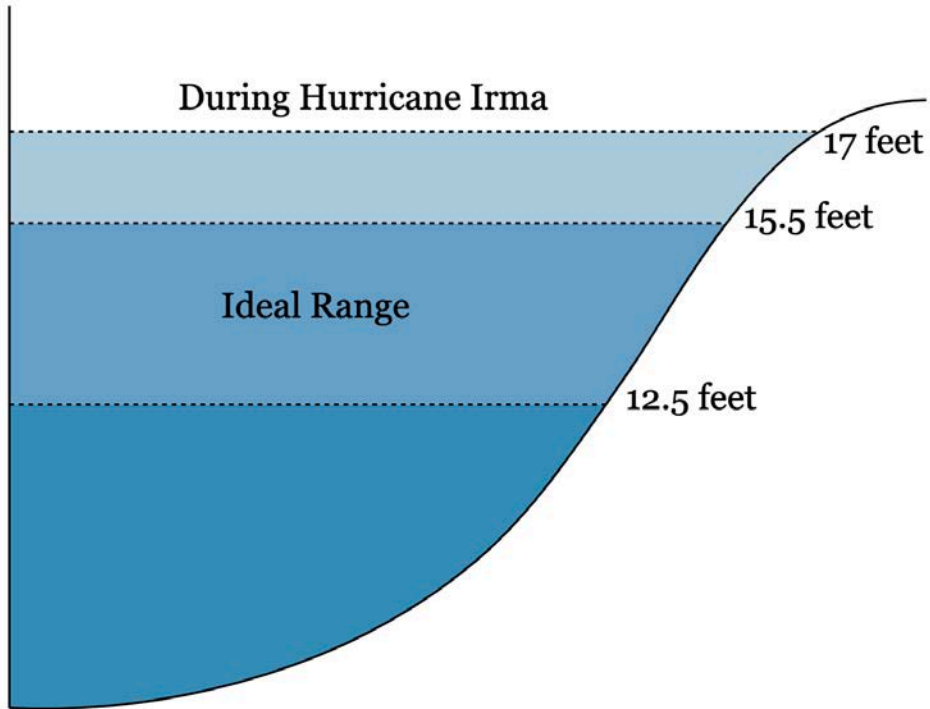
After heavy rains drive up water levels in Lake Okeechobee, the U.S. Army Corps of Engineers begins discharging water into rivers to the west and east of the lake.

The discharges of lake water through the Caloosahatchee and St. Lucie rivers cause repeated environmental crises - toxic algae ruin fishing, harm wildlife and drive away tourists.

WHY ARE THE RELEASES INCREASING?



Lake Okeechobee's Water Levels



Hurricane Irma brought the lake's water level above 17 feet, exceeding the 12.5- to 15.5-foot maximum target range.

Army Corps is trying to keep the lake level lower in the spring by increasing releases.

Spring water is laden with fertilizer runoff both from agricultural operations and residential fertilizer use, as well as sewerage and other toxic releases.

Spring releases reduce the risk of the lake reaching dangerously high levels during the summer hurricane season, when a powerful storm could send water into the lake much faster than the agency can move it out:

Lake O can fill up six times faster than it can be drained by canals.

Authorities fear high water levels could burst through the lake's decades-old dike, a towering mound of rock, gravel and shell encircling the lake to guard against flooding.

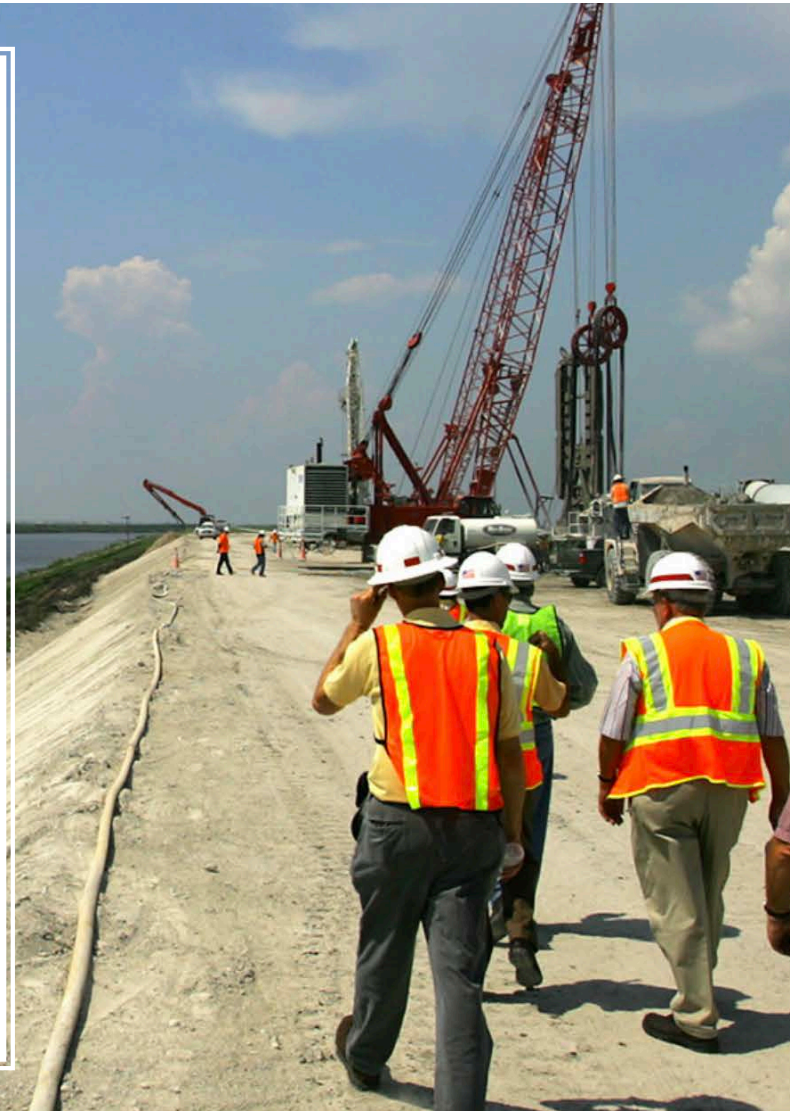
Rising waters raise fears of a dike breach similar to what happened in New Orleans during Hurricane Katrina.

The outdated wall of the 70+ year-old Herbert Hoover Dike is a 30-foot-tall barrier of limestone, sand and shell that rims the lake.

The federal government has labeled it one of the country's most at risk of failing.

It's all that protects South Florida from flooding.

Shoring up the crumbling walls of the aging Herbert Hoover Dike began more than a decade ago and may take another decade to complete.



Repairs to the more than 70-year-old Herbert Hoover Dike began in 2007.

Back-Pumping Concerns



1 Sometimes when rains south of the lake threaten to flood crops and lakeside towns, **water gets pumped north into the lake**. That “back-pumping” can carry with it fertilizers, pesticides and other pollutants that can lead to fish kills, toxic algae blooms and threaten drinking water supplies.



2 Back-pumping is a rarely used flood-control alternative that was triggered for a short time this year to protect “lives and property” near the lake, according to the South Florida Water Management District.

Usually, lake water is drawn south by canals and helps irrigate sugar cane, vegetables, rice and other crops in the nearly 500,000-acre called the Everglades Agricultural Area.

But when flooding threats rise in that large farming region, the lake’s typical southern discharges are stopped in favor of draining water east and west.



3 The lake’s rise at times this year has triggered maximum-level draining to the east and west to lessen the strain on the dike, which the federal government has labeled **one of the country’s most at risk of failing**.

Holding back water with mounds of earth and rock was common practice back in the 1930s. But the lake’s barrier has proven **susceptible to erosion**, which today risks sending flood water gushing across South Florida.

A WATER MANAGEMENT DISASTER

When water becomes too high in other areas, it is pumped from the Everglades into Lake O.

The pumping moves water *out of* sawgrass marshes in western Broward and Miami-Dade counties,

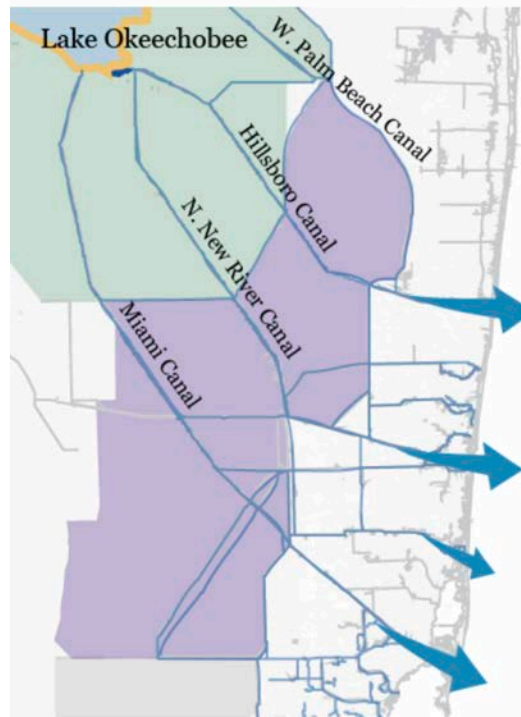
into Everglades National Park to try to head off flooding in critical wildlife areas.



Water Conservation Areas are mainly signature Everglades sawgrass marshes interspersed with tree islands. Ownership is mixed, with State, South Florida Water Management District and private ownership.

The State leases portions of the land to the Miccosukee Indian Tribe.

Lake's Southern Outlets

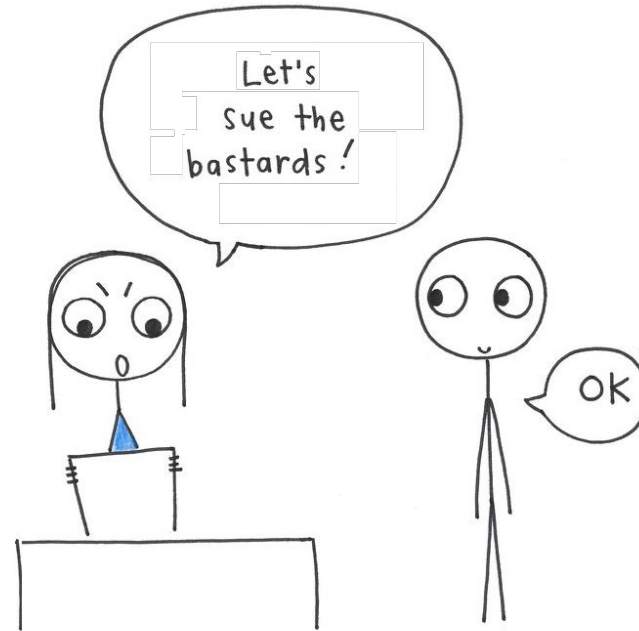


The marshes in the Water Conservation Areas are cordoned off by a system of numerous canals and levees that hold water to help safeguard against flooding, protect wildlife habitats, and supplement community drinking water supplies.

Drainage to protect South Florida from flooding can boost water levels too high in those marshes (called Everglades water conservation areas), threatening to wipe out deer, wading birds and other animals if high water lasts too long.

THE PLIGHT OF THE EVERGLADES IS EMBLEMATIC OF THE TYPE OF MOUNTING 21ST CENTURY WATER ISSUES GOING ON EVERYWHERE.

SUIT / CONTERSUIT



QUALITY / CONTAMINATION / USE / SUPPLY / DIVERSION / PRIVATIZATION / ACCESS / RESPONSIBILITY / JUSTICE

GOVERNMENT DEPARTMENTS, ENVIRONMENTAL, CIVILIAN AND CORPORATE ENTITIES, LOCAL MUNICIPALITIES, ENVIRONMENTAL JUSTICE ORGANIZATIONS, CONSERVATION GROUPS.....

[Florida officials delayed telling residents about bad water ...](https://www.miamiherald.com/news/state/florida/article223624930)
Jan 3, 2019 - It took months for the Florida Department of Health to notify the neighbors of ... adverse reproductive and developmental effects and some types of cancer. ... joined a class-action lawsuit against flame retardant manufacturers, ...

[Opa locka, FL faces lawsuit, ongoing water utility problems ...](https://www.miamiherald.com/local/miami-gardens/article224246455)
Jan 17, 2019 - The public water utility in Opa-locka, Florida, faces complaints about high bills, ... class action lawsuit against the city moves ahead over the "inflated" water bills. ... Among the properties on the list were several public housing ...

[Florida Joins Lawsuit Against EPA Over Clean Water Act ...](https://news.wfsu.org/post/florida-joins-lawsuit-against-epa-over-clean-)
Jun 30, 2015 - The rules broaden the list of water bodies that fall under EPA authority. In February, Florida Agriculture Commissioner Adam Putnam testified ...

[EPA Sued Over Florida Water Pollution - CBS News](https://www.cbsnews.com/news/epa-sued-over-florida-water-pollution)
EPA Sued Over Florida Water Pollution. July 17, 2008 / 4:30 PM / AP. Five environmental groups sued the U.S. Environmental Protection Agency on Thursday, claiming the federal government is violating ... Right Rail - Video Promo - Listing.

[U.S. warned of lawsuit over water plan's role in Florida's 'red tide' ...](https://www.reuters.com/article/environment-redtide/u-s-warned-of-la-)
Dec 19, 2018 - U.S. warned of lawsuit over water plan's role in Florida's 'red tide' Three environmental groups on Wednesday said they intend to sue the U.S. government for allowing "unmitigated discharges" of polluted water from Florida's Lake Okeechobee, possibly contributing to red tide algae blooms harmful to marine species.

[Florida | Earthjustice](https://earthjustice.org/about/offices/florida)
A complex litigation campaign by Earthjustice attorneys worked to compel state and federal agencies to comply with the Clean Water Act and set numeric limits ...
Missing: 1467

[Discharges From Florida's Lake Okeechobee Challenged In ...](https://miami.cbslocal.com/2019/06/11/discharges-florida-lake-okeech-)
Jun 11, 2019 - The lawsuit filed Tuesday contends the U.S. Army Corps of Engineers has ... damaging blooms of blue-green algae due to the lake water.

[Clearwater residents file lawsuit claiming tap water sickened ...](https://www.abcactionnews.com/news/region-pinellas/clearwater-resid-)
Oct 11, 2019 - Now, some of those families are suing the park claiming the water coming from their ... Events · Right This Minute · The List · Picker and Ben Show · TV Guide ... Clearwater residents file lawsuit claiming tap water sickened their kids ... Leaders from the Florida Department of Environmental Protection sav the ...

Miccosukee v. United States

MIGHT THIS BE A CASE OF ENVIRONMENTAL INJUSTICE?



The Miccosukee Indian Tribe holds rights to use and enjoy certain portions of the Everglades inside the Water Conservation Areas.

There are clashes between the Tribe's rights to use and enjoy these lands and the Army Corps's operational duties.

After being dispossessed and relocated multiple times, the Tribe agreed to give up its land claims and entered into a lease agreement with the State of Florida that had three purposes:

- (1) to preserve the Leased Land in its natural state for the use and enjoyment of the Miccosukee Tribe and the general public;
- (2) to preserve fresh water aquatic life, wildlife, and their habitat; and
- (3) to assure proper management of water resources.

It also granted the Tribe a variety of specific rights including the right to use and enjoy the land.

In exchange, the Tribe agreed to concede to the water management activities of the SFWMD and the Corps.

Since the Corps began releasing excess water from Lake Okeechobee, the tribe has struggled with flooding and extremely high water levels.

The Tribe filed suit through the courts that one of the flood gates remain open beyond the regularly scheduled November 1 closure date because of extremely dire conditions. The petition was denied.

The tribe claims it is irreparably harmed as a result of Water Management actions, and now has no legal recourse.

Excessive and damaging water levels on Tribal Lands and property have violated the Tribe's rights under the 5th Amendment (life, liberty & property), under Florida Indian Land Claims Settlement Act and Permanent Lease and the Trustee Deed.

- <https://law.justia.com/cases/federal/district-courts/FSupp/980/448/1883284/>

US Sugar v. United States

The agricultural giant and a trio of environmental groups file separate lawsuits against U.S. Army Corps over Lake O discharges.

At issue is the 2008 Lake Okeechobee Regulation Schedule (LORS), which the Army Corps uses to dictate the water levels of the lake, typically held between 12.5 and 15.5 feet.

The lawsuit by the country's largest sugar producer, *U.S. Sugar*, alleges that water levels are being kept below that range without an *Environmental Impact Study (EIS)* to determine the effects of doing so.

Big Sugar claims "The Corps since November 2018 has been releasing unprecedented amounts of water from the Lake... "driving [it] to extreme low levels and man-made drought," in violation of the National Environmental Policy Act (NEPA) and the Administrative Procedure Act (APA).

Big Sugar insists it shares "similar concerns with environmental groups who filed an earlier lawsuit over the U.S. Army Corps of Engineers' complete disregard of its own policies and procedures" governing the lake.

The lawsuit from the Center for Biological Diversity, Calusa Waterkeeper and Waterkeeper Alliance, a trio of environmental organizations reads "releases are killing countless marine species, harming human health, crippling local economies, and violating U.S. laws enacted to protect the environment."

Those environmental groups are also suing because they want an EIS before releasing algae-choked water to the Caloosahatchee River, which fuels red tide.

Do you think it's often that farmers and environmental groups are on the same side of a lawsuit in these types of litigation?

Yeah, no...not
really.

Keeping the lake low reduces the need for continuous discharges which contribute to the spread of toxic blue-green algae/red tide.

But keeping the lake too low can reduce water for irrigation.

Farmers rely on the lake as a water source, as do several local municipalities, such as West Palm Beach, that utilize Lake O's water.

U.S. Sugar is suing because the Corps is deviating from its LORS schedule, resulting periodically in low lake levels and threatening irrigation supplies (it's been as low as 10.79 feet) .

The filing from U.S. Sugar asks the Court to instruct the Army Corps to operate within the the LORS schedule of releases.

When U.S. Sugar spokesperson Judy Sanchez was asked if the lake quickly fills up again, and we don't have any water shortages, isn't the lawsuit a moot point?

Sanchez responded with "The lawsuit was filed because the Corps did not follow its own rules and regulations, not because of whether or not it rained," she responded.

<https://www.tcpalm.com/story/opinion/columnists/gil-smart/2019/08/09/we-finally-get-break-toxic-algae-and-u-s-sugar-sues/1952969001/>

DON'T BLAME THE SPARROW



As a species, the fragility of the small seaside sparrow stems from two of its attributes. It has a short lifespan, and its nesting success depends on specific kinds of vegetation and water levels. If it is to survive, this species must have favorable breeding conditions without long periods of interruption.

The sparrow exists in six subpopulations, all of which live in or around the Everglades. One of them is located apart from the others, which might provide the species with a measure of protection against extinction if some calamity were to wipe out the other five subpopulations. This important outlying group, called “Subpopulation A,” lives directly south of the S-12 gates of Lake Okeechobee.

It has decreased from more than 2,600 birds in 1992 to 112 birds in 2006. The Corps' method of releasing water into the Everglades, specifically at its S-12 gates, has been blamed for that decline.

The sparrow's habitat has been threatened by the Corps's water management activities since the 1970s, when water discharges began exceeding guidelines in order to ensure water supply and flood control demands for the Everglades Agricultural Area were met.

The Cape Sable seaside sparrow was listed as an endangered species in 1967. It lives in and around Everglades National Park.



The endangered Cape Sable Seaside Sparrow struggles to survive, nesting in the grassy high ground in the Everglade's marl prairie.

These additional discharges had a dramatic effect on the surrounding environment.

In particular, water levels became disproportionately high in the western half of Everglades National Park.

Unsurprisingly, this phenomenon—where Subpopulation A is located—caused the area to become unnaturally wet.

The park suffered severe ecological consequences as a result, including a decline in the Cape Sable seaside sparrow population.

In the 1980s, experimental program involving the NPS, US Fish & Wildlife, Corps, and Water District Management, began testing different water release scenarios.

Each test, designed to recalibrate the gate and canal systems to approximate naturally occurring water flows that existed prior to human engineering of the Everglades, lasted for years.

In 2002, the Corps instituted a longer-term solution designed to accommodate sparrow breeding patterns. Because of their short life span, in order to increase the population, the sparrow must have at least two nesting cycles per year. A nesting cycle only will occur if the sparrow's habitat remains continuously "dry" (water levels in the nesting habitat must be below six feet) for forty days.

To maximize the number of continuously dry periods, to achieve at least two nesting cycles, the S-12A gate was closed on November 1 and reopened on July 15, to approximate the Everglades dry season.

The Everglades rainy season lasts from July to October, which prevents nesting cycles from occurring then. Because there is no risk of disrupting a nesting cycle during the rainy season, the S-12A gate is opened during this period to relieve the reservoirs of water buildup.

The U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service continue to work with state officials to regulate the amount of water sent to the sparrow's nesting grounds in the spring, to give the birds a chance to breed.

- <https://caselaw.findlaw.com/us-11th-circuit/1631347.html>



Canal in Everglades National Park

However.....

The Corp's efforts don't stop water from being sent into Everglades National Park. In fact, more water than ever is being moved through a spillway connecting through a water conservation area to the park through one of the canals.

SFWMD representatives blame the sparrow for the St. Lucie and Caloosahatchee estuaries being bombed with discharges from Lake O as a result of protecting the sparrow, effectively blaming it for the toxic algae disasters that result from releases to the coasts.

This isn't true. The Corp's water management section has confirmed that state and federal authorities have sent unprecedented volumes of water into the northeast portion of Everglades National Park. Even in the rainiest dry season, actions taken to protect the birds don't restrict the agencies' ability to send water into Everglades National Park.

But Water Management District representatives publicly decry the state as being shackled to a single-species management policy (the sparrow) at the expense of devastating hundreds of other species.

The FWS approach to protecting the sparrow, and other Everglades species, is not a single species management system.

They manage habitats, and the marl prairie, home of the sparrow, is itself endangered. **Their goal is to preserve the entire ecosystem.**

- Reducing flows into the sparrows' nesting grounds does not force Lake Okeechobee discharges to the coasts.
- The impact of lake water levels is almost unrelated to water levels in the Water Conservation Area. The primary source of water is rain.
- During the dry season, the closure of S-12A and S-12B flood control gates that protect the sparrow's nesting cycle have no impact on the volume of water flowing east and west to the St. Lucie and the Caloosahatchee.
- Claims that the sparrow drives water management policies responsible for the collapse of the St. Lucie, Caloosahatchee, and Florida Bay estuaries may distract the public from the debate over Everglades restoration, which increasingly pits Florida's appointed water management officials against federal agencies, scientists, residents, and local businesses.

The Miccosukee Tribe alleges that the closing of the gates that protect the sparrow has kept water levels above the gate abnormally high, resulting in harm to the Tribe, and threatening the habitat of another endangered species, the snail kite.

The Tribe claim that the assessments of the sparrow nesting cycle are inaccurate, and that the flooding of Miccosukee land is a clear case of environmental injustice, as tribal land is flooded to protect agriculture and settler lands.

As for the sparrow whose population has plummeted in recent years, the U.S. Fish and Wildlife Service in collaboration with the Army Corps, recently issued a jeopardy biological opinion with a plan to regulate water levels flowing through the Water Conservation Area and the birds' marl prairie habitat. As in the spring of 2016, their plan includes sending more – not less – water south into the eastern reaches of Everglades National Park.

For more than ten years, moving more water south instead of to the coasts, and distributing it more evenly into the park and Florida Bay, has guided the planning and delivery of every major Everglades infrastructure project that connects as a series of pieces within the larger Everglades restoration vision.

<https://www.animallaw.info/case/miccosukee-tribe-indians-florida-v-us>

https://www.bullsugar.org/esa_impact_on_discharges



Miccosukee land



Snail Kite

The Everglades Agricultural Area (EAA) Storage Reservoir

Former Fl. Governor Rick Scott and Florida's sugar industry (Big Sugar is a major donor to Scott's political campaigns), together with support from the SF Water District Management), have fought bitterly against key components of Everglades restoration, especially the proposal to build a dynamic reservoir south of Lake Okeechobee (the Everglades Agricultural Area (EAA) Storage Reservoir) to clean and send more water to the park – and less to the coasts.

A keystone component of the greater state-federal Comprehensive Everglades Restoration Plan (CERP), the EAA project will theoretically send clean water south to the parched Southern Everglades and Florida Bay while reducing damaging discharge events from Lake Okeechobee to the east and west coasts.

The reservoir is anticipated to hold 240,000 acre-feet of water and include a new constructed treatment wetland, known as a Stormwater Treatment Area, to provide additional water quality benefits.

Its estimated costs are between \$1 billion - \$1.89 billion.

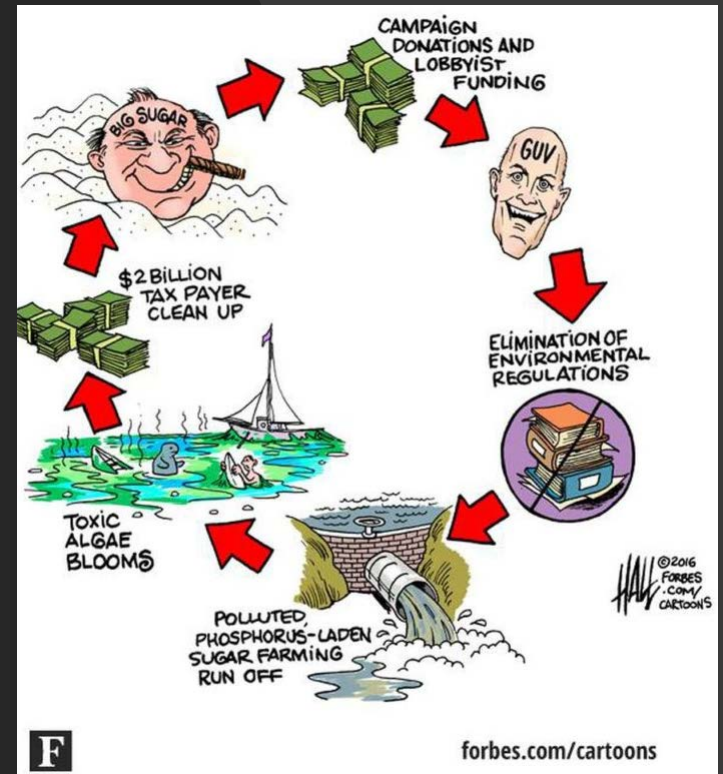
Sugarcane farming giant, Florida Crystals, has negotiated with the current pro-restoration Governor, Ron DeSantos, to relinquish some of its leased land it leases from the South Florida Water Management District (much to its dismay) in the western reaches of Palm Beach County, in order to accelerate the timeline of the EAA.

The land is part 16,600 acres Florida Crystals rents from the district under a controversial eight-year contract pushed through by Rick Scott in November 2018, a week before he left his Governorship, and subsequently renewed by the previous water management district board

The 6,170 acres the company agreed to give up in pieces between Sept. 30 and March 31, 2021 is slated for a stormwater treatment area that will clean Lake Okeechobee water before it can be sent south into the Greater Everglades. The treatment area is scheduled to be finished by the end of 2023.

<https://www.palmbeachpost.com/news/20181206/new-water-managers-defend-lease-to-sugar-grower-florida-crystals>

<https://www.tcpalm.com/story/news/local/indian-river-lagoon/health/2017/12/21/district-reveals-costs-lake-okeechobee-reservoir-expanding-project-remains-hot-topic/966715001/>



207 independent researchers in the science community who have signed a petition calling for excess Lake O water to be stored, treated and sent south.

However, William Mitsch, director of FGCU's Everglades Wetland Research Park believes the restoration project requires ecological approaches to engineering and not just civil engineering approaches to lead Everglades restoration.

He says the proposed reservoir to cut Lake Okeechobee discharges to the St. Lucie and Caloosahatchee rivers needs to be dramatically redesigned or it could pollute Everglades National Park.



South Florida Water Management District has begun clearing a sugar cane field to make way for a reservoir south of Lake Okeechobee to hold overflow releases. Muck is being scraped away to the capstone for materials to be stored on in preparation for the beginning of construction. [ALLEN EYESTONE/palmbeachpost.com]

William J. Mitsch, Restoring the Florida Everglades: Comments on the current reservoir plan for solving harmful algal blooms and restoring the Florida Everglades, Ecological Engineering: X, Volume 3, 2019, <https://doi.org/10.1016/j.ecoena.2019.100009>.

<http://www.floridasportsman.com/2015/08/20/eea-storage-petition/>



Our Engineers Plan Water Uses For Everything Except Nature's Objectives



CHANGING THE WAY WE THINK ABOUT WATER MANAGEMENT

As local residents suffer more toxic algae blooms, closed beaches, shuttered businesses, dead aquatic life and dead and sick animals that ingest it, and ailments that trigger asthma, and can be linked to Lou Gehrig's Disease, Alzheimer's and other maladies, the deteriorating quality of the human environment becomes less easy to ignore...

All these releases and moving around of water, and various lawsuits filed to protect conflicting interest groups, is a massive attempt to grapple with a wicked problem.

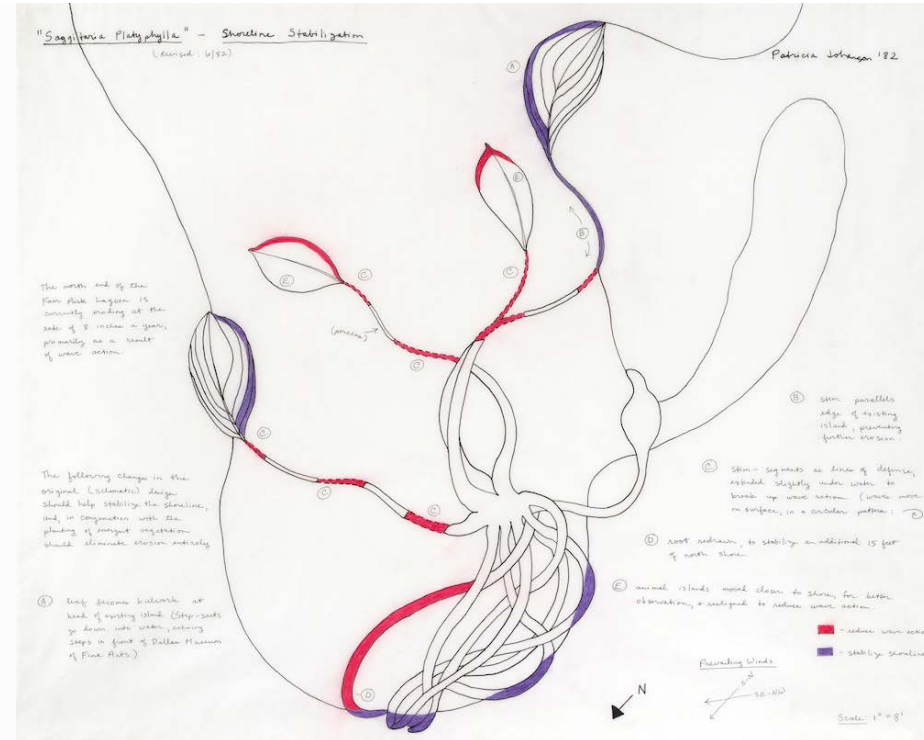
How water is released, stored and moves, how our urban and agricultural areas are protected, and how our ecological habitats can be safeguarded, must radically change.

PROTECTING OUR WETLANDS WITH SMARTER, MORE CREATIVE, MORE ECOLOGICALLY SOUND WATER MANAGEMENT SOLUTIONS

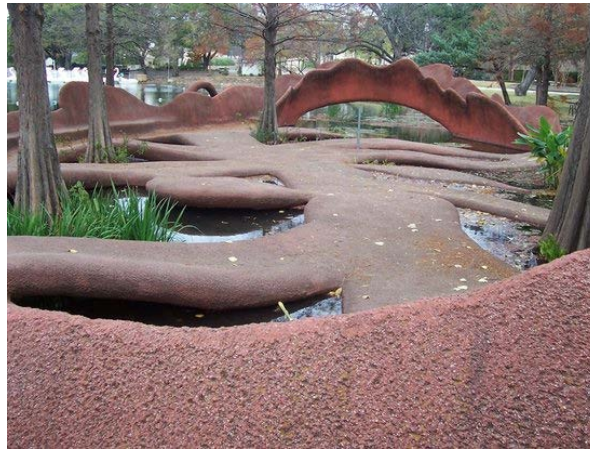
Abstract

Wetlands are estimated to cover 860 million hectares or 6% of the land surface of the world (Maltby and Turner, 1983; see Fig. 1). They have been described as the kidneys of the landscape for the biogeochemical and hydrologic roles that they provide (Mitsch and Gosselink, 1986). They prevent floods, cleanse waters, protect shorelines, and recharge groundwater aquifers. Just as important to some, wetlands provide haven for a wide variety of flora and fauna and offer a unique habitat for many rare and endangered species. But like the species that they harbor, wetlands themselves have been considered by some to be on the endangered list in the United States. While the extent of wetlands in presettlement United States is difficult to determine, our wetlands in the coterminous United States are estimated to have decreased, from approximately 60 to 75 million hectares to about 42 million hectares today (OTA, 1984; Mitsch and Gosselink, 1986). In midwestern states such as Ohio and Illinois, over 90% of the wetlands were drained, partially in response to The Swamp Lands Acts of 1849, 1950, and 1860. The riparian and coastal wetlands of the midwestern United States, which once were connected to all the streams, rivers, and Great Lakes of the glaciated Midwest are, for all intents and purposes, gone from the landscape. With their loss, our rivers and streams have lost their ability to cleanse themselves and the Great Lakes are no longer buffered from upland regions.

Mitsch W.J., Cronk J.K. (1992) Creation and Restoration of Wetlands: Some Design Consideration for Ecological Engineering. In: Lal R., Stewart B.A. (eds) *Soil Restoration. Advances in Soil Science*, vol 17. Springer, New York, NY



Patricia Johanson, sketch for *Sagittaria Platyphylla*, one of two 'sculptures' that flank the Leonhardt / Fair Park Lagoon in front of the old Dallas museum complex.



CRAFTING A FIELD OF CARE

In the early 1980s, Johanson was asked by the Dallas Museum of Art to restore the lagoon which was plagued by pollution, the loss of its natural ecosystem, and the occasional drowning. Johanson worked with both the Museum of Fine Arts and the Museum of Natural History to import native species of plants and animals, and export the invasive ones. She then constructed two large terra-cotta colored sculptures undulating on the lagoon's shoreline. Their form stems from drawings of two plants, the Delta Duck Potato and a Texas fern. The sculptures function as walkways for the public and as a thriving environment for the lagoon's flora and fauna. The project literally resurrected the lagoon ecosystem.

Unfortunately, *Fair Park Lagoon* is falling into disrepair due to financial neglect.

An image of an endangered species has a major presence at the Ellis Creek Water Recycling Facility in Petaluma, California. A constructed wetland consisting of four ponds in the shape of a mouse covers more than 30 acres and serves as a polishing filter for the 8 mgd (average) advanced treatment plant.

The wetland ponds are separated by earthen berms that define the mouse's image. Each pond has small islands that shelter nesting birds and direct the flow toward the outfall at the Petaluma River. A walking trail that represents the mouse's tail connects the wetlands to a water conservation garden and a 1.8-million-gallon concrete-lined reservoir near the plant.

The facility recycles about 40 percent of its effluent for reuse (100 percent during summer). Two golf courses, the city parks, nearby farmland and a vineyard are the primary users. The facility uses its own reclaimed water year-round for landscape irrigation, fire protection, plant process water and toilet flushing.

Wastewater receives several stages of treatment before it reaches the mouse-shaped wetlands. After conventional treatment and time in an aerated lagoon, effluent flows for about a month through eight 18-acre oxidation ponds, ending in a separate treatment wetland populated with bulrushes.

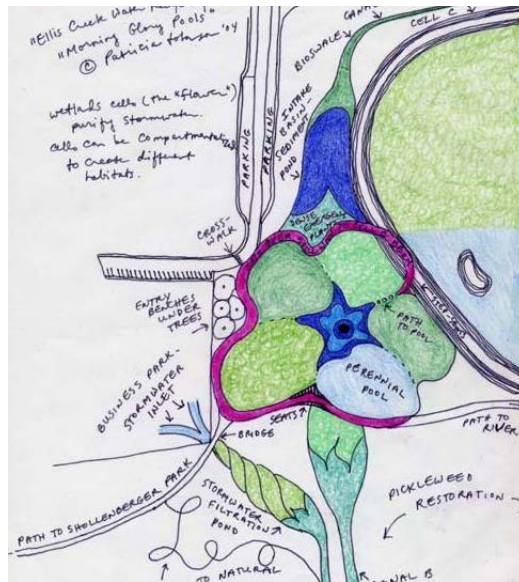
Hikers, bicyclists and bird watchers enjoy more than 4 miles of trails that traverse the wetlands. A variety of birds including pelicans, egrets, herons, sandpipers, red-tailed hawks and marsh wrens call the wetlands home. Western pond turtles are also found there, and swans and Canada geese frequent the oxidation ponds.

A connecting trail at the wetlands leads to more than 7 miles of additional trails that link to a city park, a marsh and the Petaluma River. The trail system provides public access to nearly 230 acres of wildlife habitat used for educational programs, nature study and tourism.

Two green roofs were part of the Ellis Creek project. With a combined area of nearly 13,000 square feet, the roofs of the administration and maintenance buildings were planted with more than a dozen species of ground cover. Birds including killdeer have used the roofs for nesting.

PATRICIA JOHANSON,
ELLIS CREEK WATER RECYCLING
FACILITY IN PETALUMA
WETLANDS, CALIFORNIA.
Early 2000s / \$140 m

(includes oxidation ponds, sewage treatment wetlands, and polishing ponds for the removal of heavy metals, and a 272-acre tidal marsh and mudflat park).



Artist/Civil Engineer, Viet Ngo.
Lemna Wastewater Treatment
Facility, Devil's Lake, North
Dakota, 1990.



.A series of holding ponds and serpentine channels spread over 58 acres looks something like a huge hieroglyph; the design is best viewed from the sky. The project's design won numerous international recognition and awards.

Viet Ngo's Lemna Wastewater Treatment Facility is the only one in North Dakota and it is the second largest in the World at a total of 58 acres. It is an all natural treatment system, no chemicals are used. It relies on the growth of duckweed (Lemna) to remove the contaminants.

Civil Engineer Viet Ngo and the Lemna Corporation designed the water treatment facility in 1990. The project can be described as both a cost-effective way to clean water and a large-scale environmental artwork.



EAST KOLKATA WETLANDS (EKW)

A SUPERLATIVE EXAMPLE OF TRADITIONAL ECOLOGICAL KNOWLEDGE AT WORK

The EKW, through a connected string of traditional bioremediation processes that in turn support a culture of urban agriculture and pisciculture, are of great environmental and economic significance.

The Wetlands, covering an area of 12,500 ha east of the city, is recognized as a superlative model of a multi-use biorecovery system. Developed by local people over two centuries, the resource recovery initiated in the Wetlands has provided the city of Kolkata with a cost-free, environmentally friendly wastewater treatment plant which makes use of the treated water for pisciculture and agriculture.

The water flows through fishponds that act as solar reactors to complete most of the bio-chemical reactions necessary for bioremediation. These processes are a rare example of a resource management system where complex ecological processes have been adopted by local farmers for mastering multiple resource recovery activities.

As the “kidneys of Kolkata,” these processes provide a wealth of public health and socio-economic benefits. Treated sewage provides water for irrigation and pisciculture.

The Wetlands provide the city with approximately 150 tons of fresh vegetables daily and 10,500 tons of table fish annually. This supports the livelihoods of approximately 50,000 people directly, and indirectly about another 50,000. The fishponds are primarily operated by worker cooperatives.



How can you envision shaping a better future for Florida's wetlands, freshwater and marine systems?

