WATER QUALITY TRADING

Illinois Pollution Control Board

Brown Bag Lunch Series

Episode 9

September 22, 2016

STARRING

- **Gerald Keenan**, *Chairman* — *as ObiWan Keenan*
- **Jason James**, *Attorney Assistant* — *as Jason Skywalker*
- **Anand Rao,** *Technical Unit* — *as Anand Solo*
- **Alisa Liu,** *Technical Unit* — *as Princess Lisa*

A long, long time ago, in Chicago not so far, far away…

…the first municipal sewer system
in the United States
was constructed in 1856
right here in Chicago.[1]

Nearly 60 years later,
the City of Evanston
opened the first complete water treatment plant
on the shores of Lake Michigan in 1914.[2]

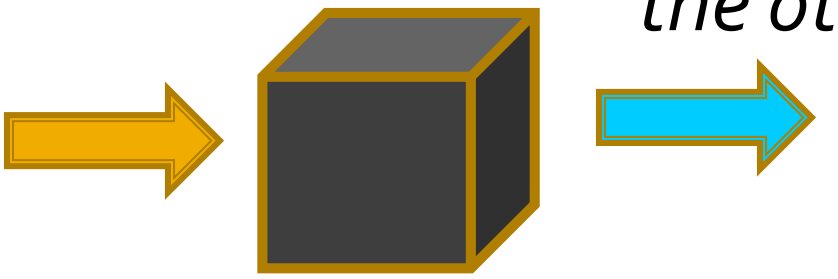
Just within the past 100 years,
we have refined
the technology of
wastewater treatment to
a scientifically sophisticated level,

not only for human sewage
but for the complexities of
industrial wastewater.

We have done well.

- We have done it so well, wastewater treatment now is almost like a black box.

Dirty water goes in one side.



Clean water comes out the other side.

Illinois Water Quality Regulations

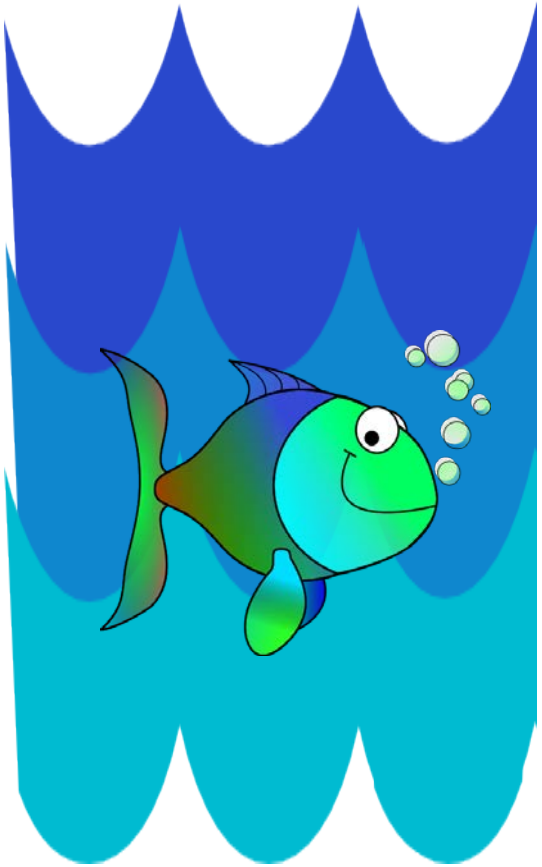
Existing Illinois regulations rely on these end-of-pipe treatment systems to require point sources of water pollution to meet certain effluent limits, and to good effect:

The percent of Illinois waterways that were assessed were rated "Good" for Aquatic Life:

- 58% of Illinois streams
- 91% of Illinois lakes[3]

However, impaired waters still persist, mostly due to nonpoint source pollution.[4]

Causes of impairment persist.



- Mercury, nutrients, sediments, temperature, chlorides, and low dissolved oxygen still threaten Illinois' waters.[5]
- In Illinois waterways, low levels of dissolved oxygen result from algae blooms fostered by the nutrients. The oxygen-depleted waters cannot sustain aquatic life, including fish, mussels and other creatures.
- On the national level, nutrients from urban sources and agricultural runoff contribute to the Gulf Hypoxia dead zone over 1000 square miles of the Gulf of Mexico.[6]

The more you tighten your grip…

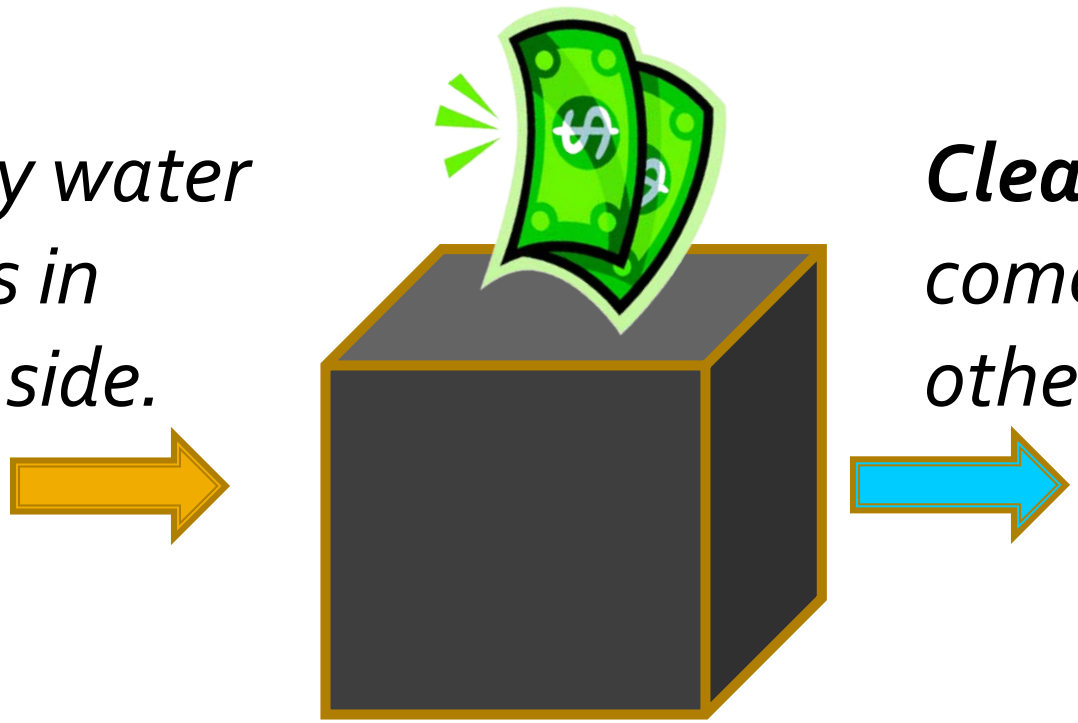
…the more water treatment systems will be faced with significant costs.

- Pressure is mounting on permitted point sources.
- Point sources are looking at more stringent controls and more investment in end-of-pipe technologies.
- Illinois EPA estimates that the annual cost to meet a 1 mg/L phosphorus effluent limit could exceed $114 million and still achieve only 44% of the target reduction.[7]

What does tradition say to do?

- As the state of the science evolves, we decide we need cleaner water, and we pass regulations with tighter effluent limits.
- So we spend more money and build a bigger box.

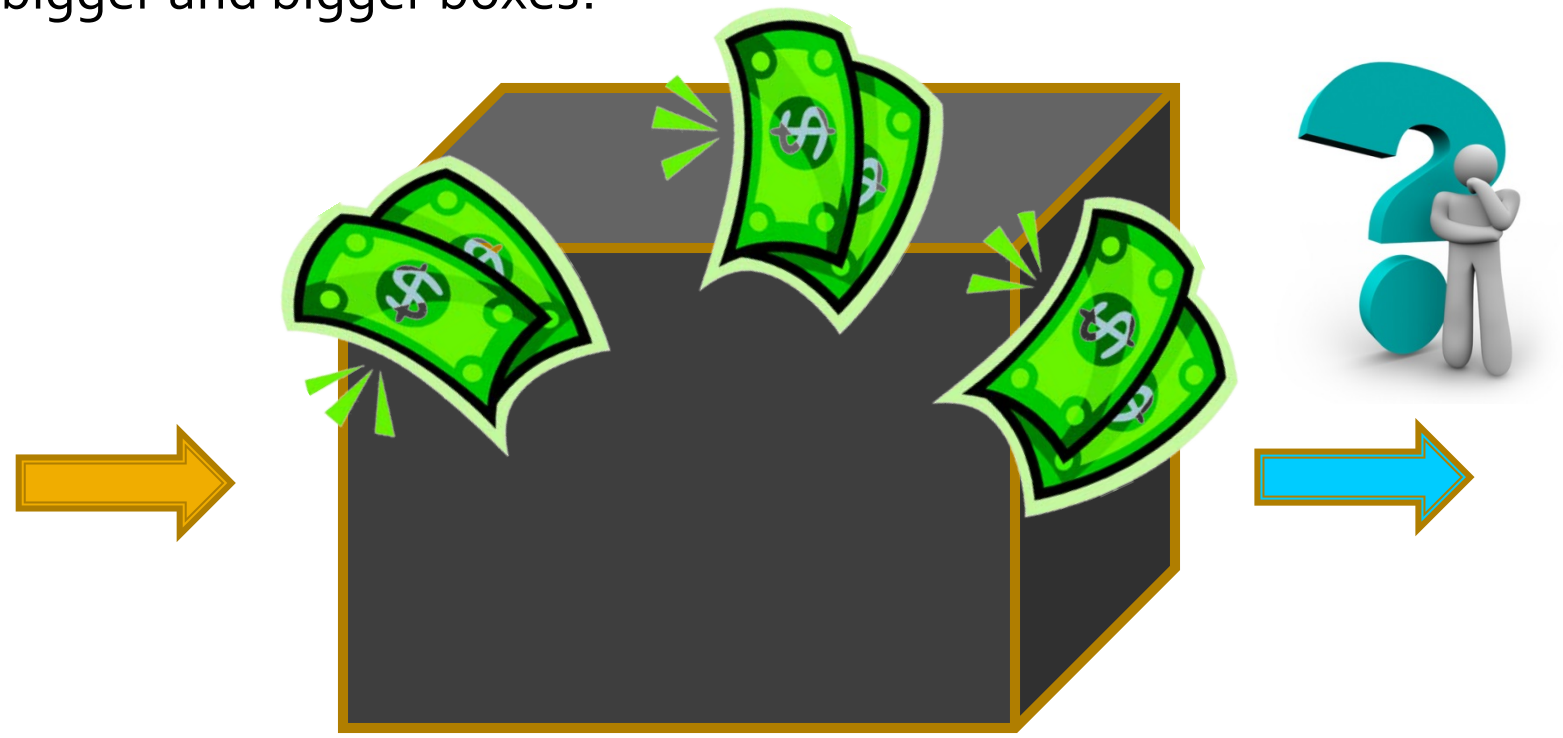
Dirty water goes in one side.



***Cleaner** water comes out the other side.*

We feel the conflict within us.

- Of course, science will continue to evolve, and water quality demands may grow even more stringent.
- The question is: Should we keep spending more money to build bigger and bigger boxes?

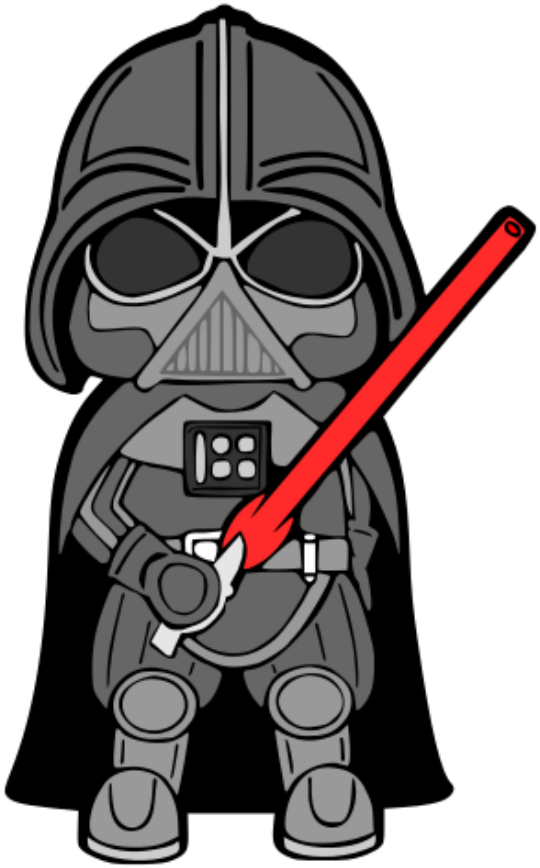


What might Vader say?

"Don't be too proud of this technological terror you've constructed.

The ability [of hi-tech gadgetry to treat wastewater] is insignificant next to the power of The Force."

-Based on Lucas Films, Star Wars: Episode IV- A New Hope, 1976



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For us, it is…

Image from: pics-about-space.com

The Force of Nature

- Nature has been treating wastewater nearly as long as life has existed on the Earth.

  That's about 3.8 billion years.

- When Nature treats wastewater, she doesn't use pumps and electricity. She doesn't use toxic chemicals.

- She uses renewable resources. She uses the power of the sun. Her main chemical reaction is photosynthesis.[8]

Mmm. Nature. Much to learn we have.

- Instead of building a bigger box, perhaps it's time to look outside the box.
- ObiWan would say, "Luke, use The Force."
- Of course, most of us here are untrained in the ways of The Force.
  So we ask, "How?"

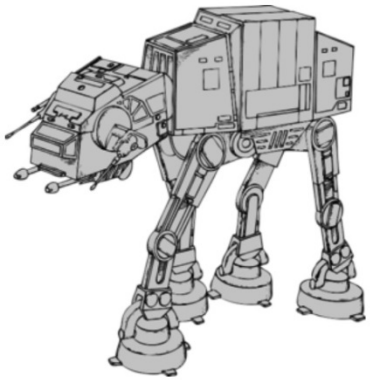
Image: https://clipartion.com/free-clipart-5533/

We must learn the ways of a new Acronymn…

STAR WARS UNIVERSE

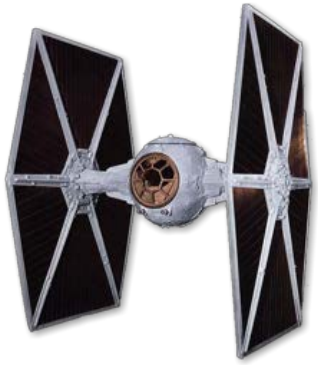
AT-AT

- **A**ll **T**errain-**A**rmored **T**ransport



TIE Fighter

- **T**win **I**on **E**ngine Fighter



OUR WATERY WORLD

BMP

- **B**est **M**anagement **P**ractice

- BMPs are changes in the way we do things to keep pollutants on land from entering the waterways.

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http://Iconbug.com/detail/icon/5621/star-wars-tie-fighter/

BMP Example for Nutrients & Sediment:

- Agriculture Filter Strip

Image from:
http://landstewardshipproject.org/cmsimage/1495/large

BMP Example for Nutrients & Sediment:

- **Constructed Wetlands** (for nutrient-rich agricultural tile drainage)

Image: Constructed Wetland at The Nature Conservancy Franklin Research and Demonstration Farm, Lexington, IL (2016)

BMP Example for Nutrients & Sediment:

- Conservation Tillage

Image: The Nature Conservancy Franklin Research and Demonstration Farm, Lexington, IL (2016)

BMP Example for Temperature:

- Shade Tree Planting – for Solar Heat Load Reduction

Image from:
http://upstreammatters.com/we-need-riparian-buffers-heres-why/

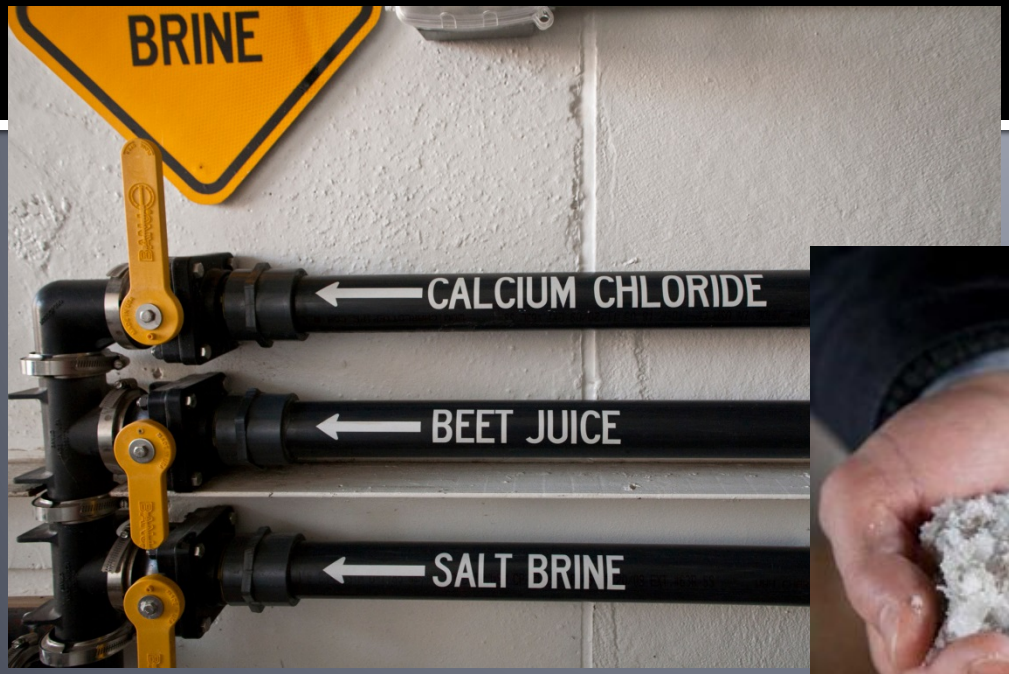
BMP Example for Chlorides:

- Anti-icing Salt Brine Spray

Images from:
http://www.pwmag.com/Images/tmpED6A.tmp_tcm111-1945477.jpg?width=600&404=404.png

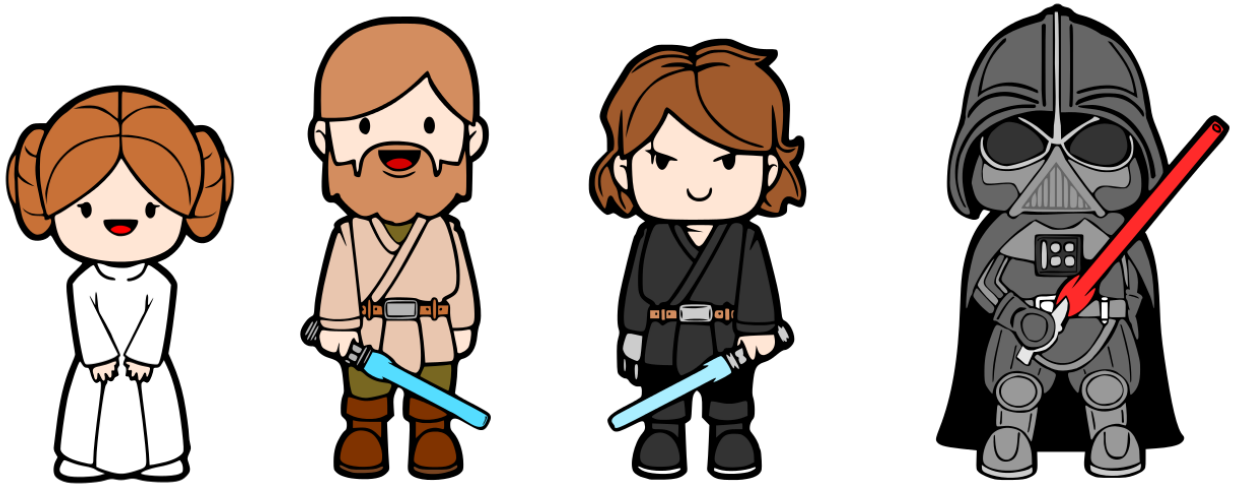
BMP Example for Chlorides:

- Alternative Deicer Mixes with Carbohydrates



Images from:
http://www.deeproot.com/blog/wp-content/uploads/stories/2014/01/Beet-juice.jpg

How do we bring the benefits of BMPs to the end-of-pipe discharges?



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Create an Alliance!

between the

POINT SOURCES

- **Point** sources are like the "box" with discharges from the end of a pipe.
- **Point** sources can include stormwater that is collected by a storm sewer system and discharged.
- **Point** sources are required to obtain an NPDES permit.

NON-POINT SOURCES

- Non-point sources are outside the "box".
- **Non-point** sources come from stormwater that washes pollutants over land directly into receiving streams.
- Most **non-point** sources are not required to have an NPDES permit.

Q: How can this alliance work?

A: With Water Quality Trading.

- Water Quality Trading provides a mechanism where point sources, nonpoint sources, and other parties can generate, sell, buy, trade and retire credits of a particular pollutant.

USEPA Policy

USEPA adopted a Water Quality Trading Policy in 2003.

The policy encourages states to adopt market-based approaches that "provide greater flexibility and have potential to achieve water quality and environmental benefits greater than would otherwise be achieved under more traditional regulatory approaches."[9]

Why trade?

- Trading leverages the reality that different sources in the same watershed can face very different costs to control the same pollutant.

- Trading allows facilities facing higher pollution control costs (like a wastewater treatment plant or a municipality with a stormwater permit) to meet their regulatory obligations by purchasing lower cost pollution reductions (credits) from another source.

How about an example?

- Sources that could reduce a pollutant for less cost could include farms that use BMPs to keep nutrients and sediment from washing off their fields into local waterways.

- For example, Virginia has a nutrient trading program to offset stormwater phosphorous loads from new development. It has saved more than a $1 million in water quality goals. At the same time, it is providing economic incentives to local agricultural producers to reduce soil erosion and runoff. [10]

Trading is happening all around us.

- The Ohio River Basin Nutrient Trading Program includes Indiana, Michigan, and Ohio. It is currently the only multi-state water quality trading program in the US.[11]
- Existing WQT markets also include the Greater Miami Watershed trading pilot program and the Pennsylvania nutrient credit trading program.
- Maryland and Virginia also have programs, primarily focused on improving water quality in the Chesapeake Bay.
- The Iowa League of Cities is currently developing a framework for WQT in Iowa to support the State's Nutrient Reduction Strategy.[12, 13, 14]

What does Illinois know of environmental markets?

Illinois has a proud history of using market based methods to reduce pollution.

- Our leadership in SO_2, NO_x, and Volatile Organic Material trading helped Illinois businesses and consumers achieve early and sustainable emission reductions at much lower costs than traditional command and control methods.
- Chicago's futures exchanges pioneered the use of financial instruments to facilitate environmental trading.
- The first greenhouse gas trading market, the **Chicago Climate Exchange**, was born right here more than 15 years ago.

Illinois is just beginning.

- The Piasa Creek Watershed Project used innovative techniques to reduce silt build-up in the Mississippi River, achieving superior environmental performance at significantly reduced costs via a public-private partnership. This was accomplished through a Board adjusted standard. AS 99-6.[15]

- Some NPDES permits in Illinois are just beginning to contemplate the use of WQT programs. The Villages of Bensenville and Bartlett are two examples that refer to water quality trading program to be developed by the DuPage River Salt Creek Work Group.[16]

How are credits created?

- Agricultural producers, ranchers, and landowners can generate credits for sale in a water quality market by adopting BMPs. These water quality benefits can then be translated into tradable credits.[17, 18]

- Credits can be quantified with modeling, pre-determined pollution reduction rates, and direct monitoring.[19, 20]

- Trading should be associated with a watershed or TMDL boundary to ensure benefits and to avoid hotspots.[21]
- Credits may be seasonal, annual or permanent. But a credit may only be effective during its designated life span.
- Certain types of pollution reduction projects may continue to generate credits for many years. Some practices can generate credits immediately, such as conservation tillage. Others take longer to mature, such as filter strips and reforestation. [22]

There is more to it than water.

Although the goal of water quality trading is to meet water quality goals, it has the potential to create greater environmental benefits:

- **Creation of Habitat**
- **Creation of Jobs**
- **Generation of a New Commodity**
- **Investment in Rural Illinois**
- **Opportunity to meet Corporate Sustainability Goals**

Water Quality Trading opens the door to a new arena.

- Water Quality Trading provides an opportunity for Illinois to develop innovative solutions to increasingly expensive command and control means of regulation.

- Harnessing the power of markets can expand the opportunities for pollution reduction, *e.g.*, from currently unregulated agricultural nutrient run-off.

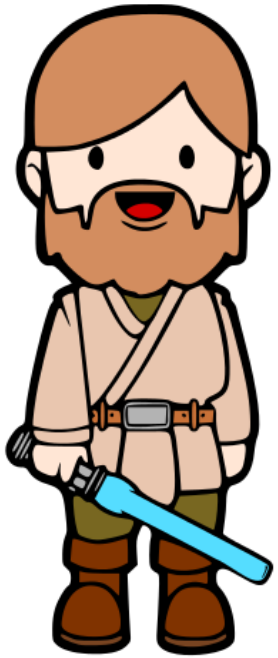
- Beyond achieving permit compliance, WQT may also lend itself as an avenue for environmental mitigation in enforcement and settlement cases. Similar to Supplemental Environmental Projects, parties could potentially use a WQT marketplace to purchase and retire credits in order to mitigate environmental harm or to provide a net environmental benefit.

The time is here.

- Financial incentives are powerful mechanisms that hold the promise of improving water quality and foster environmental benefits, all while creating favorable financial results for both those creating WQT credits and those purchasing them.
- Additionally, Illinois stands to benefit from the opportunity to generate a new tradable commodity, create new jobs, restore habitat, and improve ecosystems.
- It is time for Illinois to begin the process of considering what type of trading programs would work for the benefit of its citizens and the environment.

Now listen…

- You will tell all your friends about Water Quality Trading.
- You will say nice things about the Pollution Control Board.
- You will come back for the next Brown Bag Seminar.



And just in case you thought we had run out of cheesy Star Wars references, we have one more…

MAY THE FORCE OF NATURE BE WITH YOU!

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- **Alisa Liu,** *Technical Unit*
- ***John Fox,*** *Kent Intern*

Read more about it in our paper in the 2015-2016 Volume 6 Chicago-Kent Journal of Environmental and Energy Law.

REFERENCES

[1] Tarr, Joel A. (1984). "Water and Wastes: A Retrospective Assessment of Wastewater Technology in the United States, 1800-1932." *Technology and Culture.* Volume 25, No. 2. 226-263 at 237. Cited at http://www.macalester.edu/academics/environmentalstudies/students/projects/urbanwastewaterwebsite/Bibliography.html

[2] Trantowski, Elizabeth. "A History of Public Works in Metropolitan Chicago." American Public Works Association: Chicago Metro Chapter, May 2008 at 13.

[3] Illinois EPA, Illinois Integrated Water Quality Report and Section 303(d) List, 2016, 22–23 (2013), http://www.epa.illinois.gov/Assets/iepa/water-quality/watershed-management/tmdls/2016/303-d-list/iwq-report-surface-water.pdf

[4] Illinois EPA, Illinois' Nonpoint Source Management Program (2013), http://www.epa.state.il.us/water/watershed/publications/nps-management-program/index.pdf

REFERENCES

[5] Illinois EPA, Integrated Water Quality Report and Section 303(d) List __ (2016), *available at* http://www.epa.illinois.gov/Assets/iepa/water-quality/watershed-management/tmdls/2016/303-d-list/iwq-report-surface-water.pdf.

[6] Illinois EPA, Integrated Water Quality Report and Section 303(d) List 72–81 (2016)

[7] Illinois EPA, *et al.*, Illinois Nutrient Loss Reduction Strategy (2015)

[8] Janine M. Benyus, Biomimicry: Innovation Inspired by Nature (1997) at 2-3.

[9] 2003 USEPA Quality Trading Policy, 68 Fed. Reg. 1609 (January 13, 2003).

[10] World Resources Institute, Comparison Tables of State Nutrient Trading Programs in the Chesapeake Bay Watershed (2011), *available at* http://pdf.wri.org/factsheets/comparison_tables_of_state_chesapeake_bay_nutrient_trading_programs.pdf

REFERENCES

[11] Electric Power Research Institute, "EPRI Transacts First Credits in World's Largest Water Quality Trading Program", Palo Alto, CA, March 11, 2014, http://www.epri.com/Press-Releases/Pages/EPRI-Transacts-First-Credits-in-World%E2%80%99s-Largest-Water-Quality-Trading-Program.aspx

[12] James Shortle, Economics and Environmental Markets: Lessons from Water-Quality Trading, 42 Agricultural and Resource Economics Rev. 57, 64 (2013).

[13] World Resources Institute, Comparison Tables of State Nutrient Trading Programs in the Chesapeake Bay Watershed (2011), *available at* http://pdf.wri.org/factsheets/comparison_tables_of_state_chesapeake_bay_nutrient_trading_programs.pdf

REFERENCES

[14] Iowa League of Cities, Overview of Water Quality Trading Programs (2014), *available at* http://www.iowaagriculture.gov/WPAC/pdf/2014/WPACPowerpoint111414.pdf

[15] Mark W. LeChevallier, The Piasa Creek Watershed Project: Cleaning up the muddy Mississippi, American Water Works Association Journal 30–31 (2005), *available at* http://amwater.com/files/cr-Piasa-Creek-JAWWA-article.pdf; Great Rivers Land Trust: Piasa Creek Watershed Home Page, http://www.greatriverslandtrust.com/piasa-creek-watershed/, *last visited* August 8, 2016.

[16] Draft NPDES Permit for Bensenville South STP (NPDES Permit# IL0021849) (September 12, 2015) *available at* http://www.epa.illinois.gov/Assets/iepa/public-notices/2015/village-of-bensenville-south-stp/public-notice.pdf; Draft NPDES Permit for Bartlett WWTP (NPDES Permit # IL0027618) (August 12, 2015) *available at* http://www.epa.illinois.gov/Assets/iepa/public-notices/2015/village-of-bartlett/public-notice.pdf

REFERENCES

[17] Willamette Partnership, Building a Water Quality Trading Program: Options and Considerations, at 46 (June 2015), *available at* http://willamettepartnership.org/wp-content/uploads/2015/06/BuildingaWQTProgram-NNWQT.pdf

[18] Karen Fisher-Vanden and Sheila Olmstead, Moving Pollution Trading from Air to Water: Potential, Problems, and Prognosis, 27 Journal of Economic Perspectives 159 (2013).

[19] Willamette at 66.

[20] Shortle at 61.

[21] Fisher-Vanden, at 165.

[22] Willamette at 95, 111, 115