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SUNY Oswego Grand Challenge:
Fresh Water for All
and recognizes student work from all disciplines.

From poetry and art intended to
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FRESH WATER FOR ALL

An Anthology of Student Writing

Volume 1, Issue 2

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FRESH WATER FOR ALL: AN ANTHOLOGY OF STUDENT WRITING
Volume 1, Issue 2

Cover art: Emily Marino, “Without Harm”
Cover design by Kenneth Nichols
Additional art by Bharati Mahajan

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Created and edited by College Writing Instructor Melissa Webb

Edited by School of Communication, Media and the Arts Fellow
Kenneth Nichols

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Leilhana Abu-Sbaih

River Stone.

carved and crafted like molten wax in the hands of a candlemaker,

a stone is rid of its sharp imperfections and

born anew

from the babbling ripples of the waves; it

is whittled down not only by the caress of the water, but

the plastic that scrapes its surface—

it has lived to see the impure and the inorganic flood

the veins of the ravine and taint the breath of

life.

it has been cradled in the soft palms of strangers and

thrown askew by the living,

who pretend

poison does not run through the very wellspring of their prosperity; for

it may be trivial to their eye,

until it no longer can be.

Heather Bonter and Jeffrey Dangler

Environmental Regulation Compliance at SUNY Oswego

Introduction

The focus of this paper is to explore the need for environmental regulations and to better understand how and why these laws are enforced. Many facilities burn fossil fuels that emit dangerous greenhouse gases into the atmosphere, worsening global warming. There is also an enormous amount of chemical/oil spillage, natural waste, and usage of plastic and other nonbiodegradable substances. This paper focuses specifically on the College at SUNY Oswego's environmental impact and the rules and systems that are in place to combat these effects. After reading this paper, one will have a better understanding of SUNY Oswego's impact on the environment, the regulations that the college needs to comply with, how the college responds to these laws, how changes in laws affect the budget, how regulations are enforced, and the college's needs.

SUNY Oswego has a great reputation when it comes to environmental protection and awareness. The fact that the college's students are so educated and passionate about the environment says a lot about the school's approach to environmental regulations. The Princeton Review education services company ranked SUNY Oswego as one of the greenest and most environmentally responsible colleges in the country. SUNY Oswego's recognition reports that it is a college absolutely overflowing with sustainability, combining a rich institutional commitment to the environment with a thriving student enthusiasm toward sustainable endeavors (Oswego recognized in, 2019).

SUNY Oswego was founded in 1861 and has 700 acres on the lakeshore of Lake Ontario. $900 million was recently invested in modernized and state-of-the-art buildings and facilities. Approximately 4,300 students live on campus in residence halls (Residence Life and Housing, 2019). The role of the college's Department of Environmental Health and Safety is to "provide

campus-wide compliance with federal, state and local environmental, safety and fire regulations" (Oswego.edu, 2019). The department strives to be as environmentally cautious as possible and promote safety awareness to the community.

Ken Ayhens has been the Chief Officer of the SUNY Oswego Department of Environmental Health and Safety since 2017. Mr. Ayhens said that this job is one of the best he's ever had; he likes the exchange of information and collaborative decision-making aspects of the position. He is an emergency and risk management professional with experience in asset protection, emergency services, building codes, fire safety, and law enforcement. He was previously a fire marshal and views fire/personal safety as comparable to environmental safety in that proactive measures are crucial for ensuring safety.

Impact on the Environment

Ken Ayhens discussed how his team takes preemptive approaches and is immediately responsive to combating pollution on the campus. Since the campus is located on Lake Ontario, there isn't much time to fight problems, requiring the team to constantly be on their toes and take extra precautions. Ayhens gave the example of taking additional precautions to prevent spills from the chemistry department of Shineman Hall since it is located near the water. There are various methods of fixing and preventing these issues. One method used to prevent water contamination is using grease traps that are required in all the dining halls. Grease traps are plumbing devices used to intercept grease and solids before they enter the water disposal system (Thermaco, 2019). A technique used by the environmental safety team is using pads called pigs to soak up pollution such as oil and gas from spills on concrete.

There is also a difference in the methods used to resolve concrete and ground pollutant spills. Ground spills are more difficult and expensive to clean up because the contaminant can absorb directly into the ground and immediately contaminate the groundwater

flowing to Lake Ontario, unlike spills on concrete. Another method aimed at safety and precaution used by the campus is novec, which uses halon to combat fires in electrical areas or storage areas rather than using sprinklers. The environmental safety team takes consistent precautions by regularly testing water samples to ensure there aren't levels of lead in the water. Air quality tests are also done in case air filters need to be replaced. At a place like SUNY Oswego's campus, there's a much greater variety of safety procedures to consider than at most other businesses.

Pollution on campus is removed by Butler Garbage Disposal or may be collected by storm sewers, and the various pollutants the college deals with include sanitary, organic, chemical, and other hazardous wastes. As proactive as the Department of Environmental Health and Safety is, Ken Ayhens explained that it's just a matter of time before an accident. The college works hard to prevent freshwater pollution by being educated, aware, and prepared.

Laws and Regulations

The Clean Water Act is one of the most important environmental regulations in the United States as it is the first and primary law to govern water pollution and sets the wastewater standards for all functioning facilities. The purpose of the act is to restore and maintain the chemical, physical, and biological integrity of the nation's freshwater (Clean Water Act, 2019). The College at SUNY Oswego works with the City of Oswego to monitor its wastewater. Authority in regulations starts at the top with the federal government, then runs down to the state and then local/city regulations. Regulations of each governing body try to be all-encompassing and are so extensive that they can even conflict with each other. The regulations need to be stringent but flexible to account for all areas and types of businesses. SUNY Oswego's Department of Environmental Health and Safety tries to be as conscientious as possible and is also sure to report everything to authoritative organizations.

The college complies with the Clean Water Act and also follows regulations set by other organizations discussed by Ayhens. For example, the Environmental Protection Agency (EPA) was established by President Nixon in 1970 and is part of The United States Federal Government agency. The agency sets standards and regulations to protect and the health of the natural environment and the health of individuals. The Environmental Protection Agency "regulates the manufacturing, processing, distribution, and use of chemicals and other pollutants. In addition, the EPA is charged with determining safe tolerance levels for chemicals and other pollutants in food, animal feed, and water" (EPA.gov, 2019). The college also complies with state and local building codes, which are mostly concerned with fire safety.

Another agency whose laws must be complied with by SUNY Oswego is the Department of Environmental Conservation (DEC), a department of the New York State government. Established in 1970, the DEC regulates the conservation and protection of New York's natural resources. SUNY Oswego works with the DEC when it comes to solid waste management and hazardous waste management (Regulations - NYS Dept., 2019). Another agency that Ken Ayhens heavily discussed is The Occupational Safety and Health Administration (OSHA), an agency of the United States Department of Labor also formed in 1970. "OSHA's mission is to ensure that employees work in a safe and healthful environment by setting and enforcing standards, [providing education], and assistance" (Laws and Regulations, 2019). All employers must comply with all applicable OSHA standards.

Ayhens spoke about the importance of the terminology used when complying with regulations. He discussed that when authorities use "shall", it means that the regulation is mandatory. If a speed limit law states "you shall go 55 mph" this is somewhat lenient, but environmental regulations are far stricter. He went on to say that regulations aren't as strict when the words "should" or "can" are used. After talking about the significance of wordsmithing in regulations, Ayens spoke in depth about Amanda's Law and its significance. Amanda was a 16-year-old girl having a sleepover at

her friend's house in the basement, where there was an unknown problem with the boiler system. Amanda did not wake up the next morning. As a result, “on February 10, 2010 Amanda’s Law went into effect in New York State to help protect you and your family from the deadly effects of carbon monoxide poisoning” (Fork’s Fire Department, 2019). After this tragic incident, all homes were required to have carbon monoxide detectors. The college’s carbon monoxide detectors are effective at sending alerts directly to University Police. Proactive and stringent regulations such as these save lives.

Mr. Ayhens said that policy changes regarding the environment have definitely been made in recent years as awareness has increased. The process of making regulations seems to be one of trial and error. Ayhens used the example of changes in laws about both cigarettes and vaping to relate to environmental regulations because adjustments are made as people find out what’s good or bad. He also discussed how as technology and knowledge improves, methods improve that aren’t as environmentally hazardous, which changes regulations. For instance, in his experience as a fire marshal Mr. Ayhens has used different fire suppressants, some of which remained in the atmosphere for hundreds of years worsening global warming. As knowledge improved, these tactics were done away with and more environmentally-friendly fire suppressants are now used, such as novec.

There are also new safety concerns as a result of technology that need to be considered now that were not issues in the past. New regulations also always take time for entities to adjust to. It took 6 years for Amanda’s Law to be fully implemented until all businesses had carbon monoxide detectors monitored by fire alarm systems. Although environmental regulations are becoming more stringent and awareness is increasing in the United States, Ayhens wishes more could be done internationally. He said, “we’re one micropiece of the pie. If everyone gets on board, it’s a lot of power”.

Response to Laws and Changes in Laws

There have been instances when the College at SUNY Oswego has been in default of regulations. Ken Ayhens described an event when a professor gave a student a snowflake preservative, but neither of them were aware that this was a highly flammable liquid. According to OSHA, this substance is a fire hazard and it was illegal to have it in the student's dorm room. This default was simply remediated by removal of the substance from the building. It's proactive measures such as these regulations that prevent disasters and harm to both people and the environment.

The Department of Environmental Health and Safety sends regular reports to the EPA to ensure that levels of substances released into the environment are within certain standards. If levels have changed since the previous period then the department will first ask if they had done something differently and attempt to remediate the issue themselves. To fix a problem, Ayhens explains that "there is usually an expensive way, an easy way, and a right way". He recalled an instance when the chemistry building had too many flammable liquids to the point where it became a fire hazard and a difficult issue for the college to remediate. Their options of remediation included the expensive option of remodeling the room to be fire-proof, the easy option of eliminating the flammables, or getting rid of the majority of the flammables while putting the remainder in flammable-safe cabinets. The latter option was the route that was taken, and the college installed three cabinets, the maximum amount allowed by the code. This entire matter took about a year and a half to resolve, proving that remediation is time-consuming. It takes writing many documents and reports as well as making all the fully informed and correct decisions.

Remediating defaults is time consuming, but it also takes time to adjust to new regulations. OSHA usually gives a year's notice to businesses and entities while continuing to inform them of details as regulations are drafted and finalized. Entities can't adjust at the flip of a switch either, it takes time for the planning and preparation on their ends, too. It also takes some time for the

college to receive the funding necessary to make these adjustments. If the college needs more flexible time limits to make remediations or adjustments, it can ask OSHA for a variance: "a regulatory action that permits an employer to deviate from the requirements of an OSHA standard under specified conditions. Employers can request a variance for many reasons, including not being able to fully comply on time with a new safety or health standard because of a shortage of personnel, materials, or equipment" (OSHA's Variance Program, 2019).

How Laws and Regulations Affect Profits

Ken Ayhens explained that the college generally experiences a decrease in profits when adjusting to changing laws. The funding to make adjustments to laws also comes from the state and therefore from taxpayers, which usually takes time to receive. This makes the process of adjusting to laws lengthy, in addition to the fact that it takes time for the organizations to establish new regulations. Mr. Ayhens also discussed how consistent environmental safety itself is costly. He said, "There are 1,248 fire extinguishers on campus. Do you know how I know that? ... Because they each get checked every month" and it takes a good amount of time and therefore money to take these precautionary measures alone. Time-consuming tasks that the Department of Environmental Health and Safety completes, such as safety checks and paperwork, are inherently costly.

When asked if profits ever change too dramatically in the instance of changes in regulations, Ayhens replied that they do not. Codes usually change gradually and with warning ahead of time, so profits gradually adjust as well. The college can also combat profit decreases by saving and preparing for adjustments early. Discovering a default in regulations, however, can be more costly depending on the problem because it may involve large-scale jobs and outside contractors may need to be brought in. Mr. Ayhens stated that it's helpful that the EPA is a consensus organization and they have experts in many fields that work with the college to resolve problems.

How Laws are Enforced

Ken Ayhens described the ways in which laws and codes are enforced at SUNY Oswego. The college has a safety inspector and a building inspector and also regularly monitors water to ensure safety on campus. Sometimes the Department of Environmental Health and Safety will bring in a third-party company to monitor things for the college. The EPA also asks for regular reports and unless there are any red flags, they don't need to send a representative from the organization. If the EPA does send someone, they will ask to have a tour following the inspector and try to immediately correct the problem at hand. If the problem can't be fixed immediately, then the college is given a violation with a time limit to find a resolution.

However, resolving violations can be a lengthy process. Ken Ayhens gave the example of there being an issue with an underground pipe. Digging up a pipe takes hiring engineers and contractors as well as other uncontrollably time-consuming tasks. The college would probably need to write for a time variance if they could not fully comply within the limit. The college would additionally need to send updates about the progress, making violations altogether expensive and time-consuming issues to correct.

The College's Needs

When asked what he thinks might be good solutions for improving regulations, Ayhens stated "there's no road map" and that regulations are improving in recent years as is. OSHA is doing a better job of getting the information out there, making it easier for the college and businesses to adjust. Since regulations are becoming stricter, OSHA is also doing a better job of protecting people and the environment. The Oswego community could benefit by being more aware of the precautions the College at SUNY Oswego takes. The Department of Environmental Health and Safety could do more information sharing to keep people aware of environmental and safety measures they can take. People

should all know about the Clean Water Act, too, so they can understand why it's the government's responsibility to play an important role in protecting our environment.

When Ken Ayhens was asked if he thinks all businesses take environmental precautions seriously, he replied, "hopefully they have the integrity to do the right thing. If they do get around regulations they can't hide forever". When it comes to responding to changing regulations, the Department of Environmental Health and Safety likes to stay on top of and ahead of the game. The department never knows what will happen down the road when more costly regulations are put in place, so they keep up to date and prepare emergency funding.

Regulations and codes are so extensive that many that are either federal, state, or local can conflict. "There are regulations for the regulations. One would think they can't get any stricter, then they always do" Ken Ayhens emphasized. He explained how a lot of laws just means larger enforcement and stated the fact that "an OSHA violation today can cost you almost 80% more in penalties after August 1, 2016" (An OSHA Violation, 2019). Ken doesn't think that the laws are too severe because regulations need three parts: codes, penalties, and enforcement. The enforcement is key.

Ken Ayhens wants graduates entering the workforce to be aware that these regulations are out there. There are hints that these kinds of laws exist, but it is not discussed often in academia. Just like how chemists should be taught about safety before experimenting in the lab, students should go into the world on learning scenarios but with a foundation of this knowledge. Ayhens also emphasizes other general safety precautions to be aware of: seatbelts, speed limits, protective goggles, cooking safety, carbon monoxide detectors, fire alarms, knowing how to use a fire extinguisher, and knowing fire safety procedures. Mr. Ayhens believes that the safety and protection of the people and the environment are both vital because we are the environment.

Conclusion

The College at SUNY Oswego deals with a substantial variety of environmental regulations covering diverse areas of safety and protection from the federal, state, and local governments and organizations. This paper discussed many of the proactive procedures that the Department of Environmental Health and Safety follows to ensure the protection and safety of the environment, students and faculty. The processes of implementing regulations, complying with regulations, enforcing them, remediating violations, and adjusting to changes in laws are more complex than one might think. Unlike most businesses, unless they're large-scale companies, SUNY Oswego needs an entire department committed to ensuring environmental health and safety. As a result, the college can effectively respond to current and changing laws in the best manner possible.

This paper is a discussion about SUNY Oswego's impact on the environment, laws and regulations, the college's response to these laws, how changes in laws affect the budget, regulation enforcement, and the company's needs. The objective of the paper is to consider the college's environmental impact and the rules that exist to prevent pollution. It was found that although there is always risk of accidental pollution, the Department of Environmental Health and Safety directed by chief official Ken Ayhens works hard to prevent such instances and ensure that preemptive measures are in place. There is also so much that goes into responding to laws and consistently monitoring all areas related to health and safety. The College at SUNY Oswego strives to comply with regulations and takes pride in promoting environmental awareness.

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Cultivating the Nile: The Everyday Politics of Water in Egypt

Kyle Monaghan, Leilhana Abu-Sbaih, Melonie Olivaries, Rachael Allen, and Sophia Rowny

Relevance and Application

Chapter 5 discusses the importance and relevance of drainage/irrigation of Egyptian agriculture . The importance of the large scale that the drainage faces is outstanding. As discussed in the chapter, "take this largely hidden flower and make it visible." It is very important to understand the important role that the drainage/irrigation system plays in the Egyptian agriculture. With common ramification such as water build up, and that soon causing salinization being an issue in agriculture in Egypt. And salinization, salt being in the content of the soil. The irrigation is a very smart and important way to preserve and keep the soil of the agricultural lands pure. In today's world, Egypts agricultural system is very important and has had a very positive effect on Egyptian economy. Giving many people jobs, adding them to the workforce.

Central Findings

Barnes unearths various findings about drainage and its effects that contribute to the greater understanding of water politics in Egypt. After the introduction of subsurface drainage, Barnes comes to realize that not only were there varied perspectives and opinions from local farmers about the new system, but also that the new draining technology changed the shaping of water flow in Egypt. This was accomplished by both altering the factors that contribute to it (such as the economy and knowledge) and possibilities of agriculture on the surface. Additionally, Barnes describes the growing inequality as a result of installing new surface drainage; as she notes, the impact of having too much water significantly influences inequalities due to uneven access to subsurface drainage. The decision-making process on where to implement subsurface drainage is influenced by many factors, particularly technical criteria, and leads farmers to campaign for their land to be prioritized by officials or leads them to install it on their own. Lastly, through discussions with international donors, Barnes depicts the involvement of international donors to be that of an "expertise transfer" as she discusses how different parties are able to have a handle on that particular type of water. Barnes concludes that the people who have access to these types of technologies and those who make the decisions surrounding them are primary examples of water politics in Egypt.

Methods & Ethics

Barnes ethnography takes an etic approach. In trying to build relationships with local farmers she works and lives side by side with a hands on approach when she can, as Barnes' gender sometimes prohibits her research. Barnes also works with local government and state agencies to understand water programs and projects and who funds them.

Area for Future Research

Barnes should follow up in a few years and make a second book in relation to this current book and update how COVID-19 has affected how water sources are used and if the same issues are still as prevalent. SInce roughly 6 years almost 7 have passed by there may be progress on how water is being dealt with or there may be other issues that have risen over the past years especially with climate change.

CHAPTER 5
(Group 1)

SCAN ME

Research Aims

In this chapter Barnes aims to understand the functions and flow of water in the drainage system of the canals. "In managing these surface and subsurface flows, farmers aim for a critical balance" (Barnes, 141). She looks at every stage of water distribution through a series of drainage systems flowing north into the main drain and then, back into the Nile. Following the drainage systems she then looks to how and where the excess water flows and what flaws exist. These series of pipes have malfunctions such as broken infrastructures causing overflows in some areas of irrigation systems, causing too much water for some farmers and not enough for others.

Research Critiques

Strengths +Weakness

Jessica Barnes uses different methods in her study to the Nile. Her biggest strength, gaining her most accurate studies come from her hands on research in Egypt. A weakness in Barnes' research would be that she is a female so she is unfortunetly limited on the research she's developing.

Brian Terra and Daniela Aquino

The Oswego Sewage Treatment Plant and How It Impacts The City

The City of Oswego owns two wastewater treatment facilities, and each receives residential and industrial/commercial wastewater. The two facilities are located within the city limits on opposite sides of the river. The Oswego wastewater treatment plants have two main facilities: the East Side Facility and the West Side Facility. In July 1971, the East Side Facility, located on the lakeshore at the end of East 12th Street, was opened in July 1971 and currently has a design treatment capacity of 5.35 million gallons per day. The present West Side facility, located at 2 First Avenue adjacent to the NRG Stream/Electric Facility, opened in 1978 and is designed to treat up to four million gallons per day.

Prior to 1971, there was no treatment of residential or industrial/commercial wastewater generated on the east side of Oswego. Untreated wastewater entered the river or lake through a number of sewer outfalls or tributaries located at various points along those two bodies of water. In 1939, a small treatment facility located on the west side was constructed and treated a portion of wastewater generated on the west side, including the State University College at Oswego. However, the treatment in this small, newly constructed facility, was limited in scope and capacity, which allowed untreated wastewater to continue to enter the Oswego River and Lake Ontario. Both treatment facilities have been expanded since their original construction, and both are capable of treating more wastewater than originally designed. Treated wastewater is chlorinated to kill pathogens and then de-chlorinated before being discharged to Lake Ontario (McGrath, 2019).

The by-product of wastewater treatment (sludge) initially was incinerated in multi-hearth furnaces and the ash transported to the County Landfill. Due to the high costs involved in meeting clean air standards in the late ’90s, the city of Oswego opted to discontinue incineration and landfill the sludge. The main component of the

city's treatment facilities is the activated sludge process, which involves the production of a biological mass of microorganisms that are maintained in separate basins and aerated to keep the microorganisms alive. Untreated wastewater is organically stabilized by passing it through these basins, bringing it into contact with the mass, which is kept in suspension by aeration.

The city's wastewater treatment plants are designed to treat the two classes of wastewater: domestic or sanitary wastes (toilets, sinks, bathing, and laundry) and industrial wastes (manufacturing processes and commercial enterprises, which can contain various pollutants and rinse waters including residual acids, plating metals, and toxic chemicals). The most significant impact that the city's facilities have on the lake is that discharged water will not prevent the lake's use for drinking, fishing and other recreational activities. Essentially, wastewater treatment is a process to improve and purify the water by removing some or all of the contaminants. The Oswego Sewage Treatment Plant strives to utilize the wastewater treatment process to make water either fit for reuse or discharged back to the environment. Without the everyday services of the Oswego Sewage Treatment Plant, the benefits we have from Lake Ontario could have simply been something of the past.

There are measures in place to protect the city's facilities from unpermitted discharges; however, the primary enforceable measure used is the City of Oswego Sewer Use Ordinance. McGrath stated that "this legal framework governs every drop of water entering the sanitary and stormwater sewers within the sewer district to ensure that it can be stabilized with the technology employed at our facilities". Once it is stabilized, it can be safely discharged to the Oswego River or Lake Ontario.

Along with the City of Oswego Sewer Use Ordinance, The Oswego State Sewage Treatment Plant must adhere to The Clean Water Act (CWA) laws and guidelines. The Clean Water Act of 1972 was created after a number of amendments were made to the Federal Water Pollution Control Act of 1948. Its purpose was to establish the basic structure for regulating the discharge of pollutants into the waters of the United States and regulating quality standards for surface waters. Under the Clean Water Act, the

Environmental Protection Agency (EPA) has implemented pollution control programs such as setting wastewater standards for industry, as well as developing national water quality criteria recommendations for pollutants in surface waters. Under this Act, the City of Oswego is required to have a discharge permit for transporting treated wastewater to Lake Ontario or the Oswego River. The standards required by the Clean Water Act and contained in their National Pollutant Discharge Elimination System (NPDES) are implemented and enforced by the State of New York under their State Pollutant Discharge Elimination System (SPDES). The City's Discharge Permits are referred to as SPDES permits and contain plant influent and effluent monitoring/frequency requirements, as well as effluent limits for conventional pollutants, metals, phenols, cyanide, volatile and semi-volatile organics and low-level mercury.

The plant's daily priority is to comply with all SPDES permit requirements. Under the requirements of its SPDES permit, Oswego developed its own industrial pretreatment program, which has been in effect since 1983. Although Oswego's industrial base has lessened, all present industrial or significant users discharging into the city's collection system do so by permit and are all in compliance. Therefore, their impact on the environment is within acceptable standards and not harmful.

In 2015, the former Superintendent of the Oswego Sewage Treatment Plant failed to take appropriate action which would have prevented the discharge of partially treated sewage to Lake Ontario. As a result, 60 times the amount of allowed wastewater entered the lake. This negligence resulted in the issuance of a Consent Order by the NYSDEC. In addition to the payment of fines incurred for violating the CWA, the city was required to develop an asset management plan and solids management plan which included steps to be taken in case there were future equipment failures. The city was also required to purchase a new centrifuge and pay for an outside laboratory that would perform unannounced influent and effluent monitoring on behalf of NYSDEC to ensure that the eastside plant was in compliance (Reitz & Velazquez 2019). One of the worst consequences of violating the CWA was a broken trust between the city and federal/state regulatory agencies, which

required substantial work on the city's part to mend. This process of mending the relationship between the city and federal/state regulatory agencies was initiated in 2016 after the election for mayor in Oswego.

In the first month of Mayor Barlow's tenure, he hired Camden Group to manage the operation of wastewater treatment facilities. Camden's Water and Wastewater Operations Division provides full operation services, as well as troubleshooting, consulting and training, to facilities throughout the tri-state area. The city under new administration and new plant management has undertaken remedial actions that go beyond mere compliance. Several of the laws and regulations that the Oswego Sewage Treatment Plant operates under have originated from the Clean Water Act, ensuring that there is no future violations. The City of Oswego also must comply with New York State 6 NYCRR Chapter 10 (Division of Water) Parts 649-941, which includes meeting compliance with the SPDES Permits. The initial response from the City, prompted by the NYSDEC's effective and timely implementation, is now a city-driven effort to make the plant a benchmark for the industry.

Current state laws are typically updated every five years to ensure they are keeping up with the changing needs of the environment. When the SPDES permit is renewed every fifth year, the Sewage Treatment Plant expects some change to occur and plans to add to their regulations when necessary. For the most part, additions to their regulatory requirements have not been too oppressive, yet there have been some instances where new regulations were just out of reach with the resources available. John McGrath stated "the intent behind most environmental law and regulation is considerate of the good of the general public, industry and the environment. That being said, without going into specifics, my experience is that certain legislation will never accomplish what it is intended to secure due to a misunderstanding of what truly needs addressing or that it is financially impossible to put into place." Although the laws and regulations are done to improve the situations in the environment and to keep residents safe, some of the

expectations are a bit extreme for Oswego Sewage Treatment Plant, resulting in revisions on current laws.

The Mayor and Common Council of the City of Oswego have the main responsibility to ensure that its Wastewater Treatment Facilities are in compliance with all current state and federal regulations governing their work. In practice, this responsibility is delegated to the operators of the East & Westside Wastewater Treatment Plants who work along with another staff person who manages the in-house laboratory operation. Together, they are responsible to provide for the education, training and licensing of the city employees who compose the work force at each facility, so that full compliance of state and federal standards are met on a daily basis. Another way in which they comply with the city and federal regulations and laws is by submitting sustainability reporting requirements that involve monthly, quarterly, semi-annual and annual submission. This information is collected on a daily basis, throughout any given year. The final way that these laws are enforced upon the Oswego Sewage Treatment plant is by having inspectors come in. Normally, NYSDEC engineers visit each plant annually. EPA representatives are also on the site every five years for an audit of the City's Industrial Pretreatment Program or whenever special needs arise that require their presence (McGrath). The Oswego Wastewater Treatment Plant follows every rule and regulation very closely to ensure they are complying with state and federal laws.

The Oswego Sewage Treatment Plant works every day to maintain and promote sustainability by eliminating wastewater. The plant works specifically to reduce conventional and toxic pollutant levels discharged by industry and other non-domestic wastewater sources into municipal sewer collection systems and the environment. For years, the plant has changed to fit the specific needs of the environment, ultimately becoming more successful.

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John McGrath Interview Questions

1. When did the Oswego Sewage Treatment Plant open?

2. Could you tell us a little bit about the history of the Oswego Sewage Treatment Plant?

3. What has been the Sewage Treatment Plant's biggest achievement in terms of environmental sustainability?

4. As the Oswego Sewage Treatment Plant, what are the significant impacts that you think sewage treatment has on fresh water supply or quality?

5. How familiar are you with the Clean Water Act and how does it affect your everyday operations?

6. Reflecting on the actions made by the former superintendent, how is Oswego Sewage Treatment plant working to recover from the damages? What were the consequences?

7. Is the Sewage Treatment Plant working towards sustainable ways to eliminate waste?

8. How do you think businesses impact the environment; specifically Lake Ontario?

9. Does the Sewage Treatment play any other roles besides eliminating waste water?

10. Beyond the Clean Water Act, what are some of the other major laws and regulations that the Sewage Treatment Plant must comply with, and how does the compliance impact the plant?

11. How do you feel about these laws and regulations including the burden and their effectiveness?

12. Are there any incentives (e.g. tax breaks) for complying or reducing pollutants?

13. How often do you have to write sustainability reports?

14. How often do the laws and regulations change over time? How do you feel about this?

15. Do you find that sometimes these laws and regulations can be too harsh?

16. If there were a regulation you wanted to improve, how you would go about doing so and why?

17. How are the laws and regulations enforced at the Oswego Sewage Treatment Plant?

18. How often do inspectors come to the sewage plant?

Cultivating the Nile: The Everyday Politics of Water in Egypt

Chapter 2 - The Niles Naidr

The Production of Scarcity

Research Goals:

- Barnes looks into the production of scarcity, focusing on the physical acts that result in water not flowing in certain regions.
- She seeks to understand how water scarcity is experienced by following the water flow, what water flows where and who uses the water, and for what purpose.
- Barnes does this since scarcity at this time can be more than just the natural aspect of little rain. Government policies, technology, and regulatory regimes can also be responsible for this water scarcity.

Methods and Ethics:

- Barnes conducted her ethnography as only an observer
- Barnes attended meeting and talked to farmers and engineers
- Barnes never places the blame for scarcity on one group of people
- Barnes researched all aspects and causes of scarcity

Relevance/Application:

- Exposing the production of scarcity calls to attention the fact that those in control of water distribution or any distribution of a resource must be able to properly govern and document what's happening to said resource at all times.
- This relates to the U.S because the Southwestern region has had a water scarcity issue since 2000, which then leads U.S readers to wonder if the water scarcity is simply due to temperatures or is there a problem in the water supply process.

Jessica Barnes's University Website:

By:
Alivia Diefenbacher,
Annelisse Garrido,
Courtney Collins,
Makai Brooks,
Sabrena Sauve,
and
Taylor Chiera

Central Findings:

- Scarcity is relative, meaning it looks different for everyone. Having 'no water' does not necessarily mean that the canals are empty. For some, it means growing no crops at all, and for some it means not being able to grow the crops of their choice.
- "A farmer goes to irrigate and finds his ditch empty; the crops wither; a harvest falls short; his daughter's wedding plans are put off until the next year." (Barnes 876) Because of scarcity, the farmer has to change events planned in his life, like his daughter wedding, due to a bad harvest.
- There's corruption in the irrigation system. Farmers are taking water out of turn, leaving the honest farmers without water.
- The people who live upstream often have more access to water than those who live downstream. Due to this, people upstream were allowed to grow more water reliant crops like rice.
- Natural elements also affect water supply, for example, due to evaporation there is less water.

Data Overview:

- Summer 2007, rainfall was high in the source regions of the nile river, this was the highest record since 1946.
- Lake Nasser was full, it was over 181.5 meters above sea level
- Each year the ministry only allows 55.5 bcm through the dam gates.
  - Because of this the Sudan does not use their 18.5 bcm the 55.5bcm is less than the water Egypt recieves.
- a dramatic decline from more than 4,000 meters cubed per capita in 1950 to 1,233 meters cubed per capita in 1988.

Critique & Future Directions:

- Barnes exploration into the problems that farmers face in Egypt is very insightful.
- The political process is problematic because some farmers are not happy with how decisions are being made.
- This book is an interesting cross-culteral experience. It's great for those who are interested in learning more about water politics and dynamics.
- This book is going to supply Egyptian decion makers with a lot of important questions in order to help them solve this pressing issue.

THE STARVING COLD

by

Remmington Johnson

EXT. LAKE ONTARIO - WINTER - DAY

Ice as far as the eye can see. Distant, in the center of it all: a trapped, stationary ship. It is listing to one side. Pack ice juts against the ship's hull like fingers clutching.

We see the frosted letters of a brass placard nailed to the weathered hull. Blowing snow partially obscures the ship's name. When it clears: H.M.S. JEALOUS OF DAWN.

Looking upwards at the main mast, giant icicles dangle from the yards. One breaks loose, falls silently. It shatters against the wooden deck with a loud CRASH. Ice shrapnel scatters everywhere.

INT. JEALOUS OF DAWN - MESS DECK – DAY

Dim candlelight flickers across tables. CREWMEN stare, eyes vacant. To a man, their cheeks are gaunt, eyes sunken, faces clean-shaven. Trimmed fingernails pick at the wooden tables.

CAPTAIN MURPHEY (male, 40's) divides a brick of hardtack and water rations from melting ice, passing each meager portion to his Crewmen. They eat and drink slowly, disciplined.

Candlelight dances in Murphey's eyes.

INT. JEALOUS OF DAWN - LARDER - NIGHT

In the dark: the sounds of scarfing, lips smacking. Heavy breathing. A door CREAKS open. A thin line of yellow light spills into the room, illuminating half the face of YEOMAN BARE (male, 20’s). He pauses, hands shaking, a partially eaten brick of hardtack clutched near his mouth.

The door opens wider. Captain Murphey’s silhouette looms in the doorway. He steps forward.

We are staring into the room through the open door. Bare shrinks away from Murphey. Murphey steps forward again.

We are staring down a hallway, into the room. We see Murphey from the back, blocking half of Bare’s terrified face. The door closes with a small CLICK.

INT. JEALOUS OF DAWN - MESS DECK - DAY

Murphey’s eyes are hidden in shadow. Crewmen devour chunks of meat from their plates. The wind howls. Candles flicker.

Emily Marino, “ Without Harm,” watercolor

Lee Parkhill, “End of Ride Reflection,” photograph

Dylan Barrett

Art as Activism

The case of the Standing Rock Sioux against the Dakota Access Pipeline highlights important issues with water control and the kinds of things artists can do to protest and communicate complex messages. Cannupa Hanska Luger, a multidisciplinary artist who grew up at the Standing Rock reservation in North Dakota, created the "Mirror Shield" Project. This artistic movement seeks to provide anyone with a chance to send aid to the Standing Rock Sioux in their protest against the construction of the Dakota Access Pipeline. The Pipeline is an extremely important case, as it demonstrates the importance of the basic right that we all have to free water and the power art has as an activism tool. To further explain the importance behind these two points we'll have to take a closer look at Luger, the Mirror Shield Project, and the Dakota Access Pipeline. We'll also be using this issue to consider Luger's outlook and thinking when approaching an artwork, with his *NATURE* sculpture as our example. Luger states, "As artists, we live on the periphery. But we are mirrors. We are reflective points that break through a barrier" ("MIRROR SHIELD" 2016). This quote illustrates the role artists can have as purveyors of social change.

Before we examine the Mirror Shield Project and what it means, we'll need to detail the artist who started it. Cannupa Hanska Luger is a multi-disciplinary artist based out of New Mexico ("Bio" *Cannupa Hanska*). Luger mainly works in ceramics, fiber, steel, cut-paper, video, and sound as mediums ("Bio" *Cannupa Hanska*). He uses these means of expression to communicate and respond to current and location specific issues. One can easily see that Luger's work is very abstract just from observing images of it. His work generally has a great sense of presence to it, it's often quite striking and will make you question what exactly you're looking at. This intrigue gives you an urge to research what the art is trying to tell you and what it was made for.

Luger was trained and received his BFA in Studio Arts at the Institute of American Indian Arts ("Bio" *Cannupa Hanska*).

As stated before, one artwork we can use to investigate the intriguing and meaningful qualities of Luger's work would be his *NATURE* sculpture (Fig. 1). *NATURE* provides a good example of Luger's thought process when making an installation, project, or sculpture. This rather abstract work is meant to represent nature as a somewhat humanoid shaped entity, a woman who possesses both masculine and feminine qualities ("NATURE" *Cannupa Hanska*). The sculpture is made primarily of three indispensable materials, steel, clay, and textiles. *NATURE*'s hair is made from unspun wool to show her as a "predecessor" ("NATURE" *Cannupa Hanska*). A quote by Luger that highlights the principle meaning behind the sculpture would be, "No matter how much you take and take and take, she's just going to keep going. She's going to outlast you." ("NATURE" *Cannupa Hanska*). One interpretation of this quote is that Luger wants to express how we as human beings can't actually affect Mother Nature, no matter how much we pollute and abuse our resources she will always outlive us. Additionally, Luger goes on to state that *NATURE*, is made of steel and is transparent, or has a wire frame body you see through, because this communicates that she's part of everything and isn't defined in any one space or time (Fig. 1). This thinking exhibits a certain simplicity but speaks loudly, it's very similar to how Luger has approached his Mirror Shield Project.

Before we go in depth on Luger's Mirror Shield Project, we'll need to go over the issue with the North Dakota Access Pipeline. The Pipeline was constructed by Energy Transfer Partners based out of Texas and is able to carry 470,000 to 570,000 barrels of oil every day (Morris and Catherine 1). In theory, this Pipeline is an incredible economic asset that would lower our dependence on foreign oil. It could boost our economy significantly and lower risk of oil contamination in our oceans. However, as all things do, this Dakota Access Pipeline comes with certain caveats and counter points to consider. Some issues include how the Pipeline's development company has handled protestors, potential spills and suspicion of groundwater contamination, and a

general high risk associated with the project (Morris and Catherine 1). As stated before, there's well grounded fear that this pipeline may damage water quality in the areas it passes through. Initially, the pipeline was going to be constructed near North Dakota's capital of Bismark. However, it was moved due to a concern over possible oil spills (Morris and Catherine 1). It was then moved away from the city, closer to where the Standing Rock Reservation lies (Morris and Catherine 2). Detractors of the Pipeline state that this newer course for the project goes over Sioux ancestral land, which would mean important sites to these people have been disturbed (Morris and Catherine 2). This concern was well grounded, as an ancient Sioux burial site has since been demolished (Morris and Catherine 1). This is neither here nor there, but one could perhaps read into this disregard of the Sioux's concerns as a choice of whose safety and comfort to care for more. Regardless of where the pipeline would've been built, there would be significant danger for water quality and destruction of property. One account of how the development company had handled the Sioux protestors states that they'd utilized attack dogs and pepper spray (Morris and Catherine 1). If we're to assume that protest in this instance was peaceful, these measures could be considered quite harsh. The Standing Rock Sioux Tribe issued a suit against the United States for the struggle they were put under (Morris and Catherine 2). The suit is for violating the Clean Water Act, National Environmental Policy Act, and the National Historic Preservation Act (Morris and Catherine 2).

Now that we've discussed what exactly the issue of the Standing Rock Sioux and the Dakota Access Pipeline is, we can move on to Luger's work with his *Mirror Shield's*. Mirror Shield is quite an apt name, as that's pretty much exactly what the art objects in question are. The *Mirror Shield* is made of reflective mylar on plyboard, which are rather inexpensive materials ("MIRROR SHIELD" 2016). The *Mirror Shield* Project was started to aid protestors of the Dakota Access Pipeline. Instructions for how to make the shields was posted around social media so that people could make mirror shields for the protestors and join the cause in some way ("MIRROR SHIELD" 2016). The Mirror

Shield, while also being simply a full body shield against things like rubber bullets, is meant to be held up in front of a worker or security guard so that they can see themselves and what they're doing or are about to do. This concept was based upon photos of Ukrainian women holding mirrors up to riot police ("MIRROR SHIELD" 2016). The idea is quite impactful, sometimes even in our own lives we can forget who we are when we're doing things. Looking yourself in the eyes forces you to accept how you're acting, it forces you to answer to yourself. It's a very simple yet incredibly meaningful concept, and although Luger hasn't truthfully founded it himself it still speaks to his thought process that he's started an initiative based on it.

In conclusion, activist art like the *Mirror Shield* project can be an extremely useful tool for our society moving forward, with Cannupa Hanska Luger's thought process and work with the *Mirror Shield* Project being a notable example. Luger conveys simple but thought provoking messages in his artwork, such can be seen in both his work with *NATURE* and his work pertaining to the Dakota Access Pipeline and the Mirror Shield Project. Luger has offered a method for many to get involved in the Standing Rock Sioux's plight with his easily recreatable "Mirror Shields". Additionally, whether you agree with the Sioux's land rights or not, the right to clean water is a problem every human being can sympathize with. The Dakota Access Pipeline is an extremely important case, it'll likely be brought up again and again in discussion moving forward. Furthermore, the Dakota Access Pipeline and it's controversy has allowed Luger's *Mirror Shield* Project to show us how art can be used in an activist context.

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Images:

Figure 1. "NATURE." *Cannupa Hanska*, Ceramic, steel, and wool, www.cannupahanska.com/nature-nurture-2015/qhfpusigzo7uit5fv40jprb4cmach5.

Figure 2. "MIRROR SHIELD PROJECT." *Cannupa Hanska*, 2016, mylar & plyboard, www.cannupahanska.com/mniwiconi/.

Brian Dallas Barrigar

Water Conservation lesson plan outline

Intended grade: Seventh-grade social studies class.

Materials: *We are the Water Protectors* by Carole Lindstorm and Michaela Goade, Water Conservation KWL chart, We are the Water Protectors reading guide.

Essential Questions: Who decides what is a commodity? How are essential resources distributed?

Description: This lesson can be used as either a standalone or in a larger learning segment on the importance of water and water conservation. Students will be able to describe the role of water protectors and define how they can become water protectors themselves. Students begin the lesson by completing the "K" and "W" sections of a KWL chart with water as the topic- listing everything they know and want to know about water. Then, students will read the book *We are the Water Protectors* filling out their reading guides as they do so. Finally, students will return to the KWL chart, completing the "L" section and sharing how they can become a water protector at the bottom of said chart.

Author's Notes:

Right outside my bedroom window sits the Oneida River which flows from Oneida Lake. I live not far from Three Rivers Point, where the Oneida and the Seneca rivers converge into the Oswego River and from there to Lake Ontario, the St. Lawrence

Seaway and then the Atlantic Ocean further beyond. Without even leaving my bedroom, I can connect the dots from my own home to the Atlantic Ocean. Water connects us and relates all of us to one another. And without water, life would not be able to cover this planet as it does. As an adolescence social studies educator, it is my role to both be a water protector and to inspire my students to become water protectors too. It is important for my students to know water has a history all its own. Its history is as old as life and just like other histories, it is filled with injustices. Filled with what happens when water is scarce, when people are denied water, and horrible images of how we disrespect this essential resource. This lesson is just one interpretation of my role as a water protector and how I can use my classroom to encourage my students into becoming social activists.

-Brian Dallas Barrigar

We Are the Water Protectors Reading Guide

Name: Date:

Directions: Answer the questions on this reading guide as you read the book, *We are the Water Protectors* by Carole Lindstorm and Michaela Goade. While you read, also pay close attention to the detailed artwork on each page.

(Before you read) How is water important to your daily life? What are some ways you use water every day?

_____
_____
_____

What is the black snake that is destroying the water and the land?

_____
_____
_____

What does "Stewards of the Earth" mean? How can you become a steward of the Earth?

_____
_____
_____

In the box below, draw a picture of something in nature/natural resource you want to protect.

Name: Date:

Directions: In the "K" section, write down everything you know about **water**. Then, in the "W" section, write down everything you want to learn about **water**. After our class activity, fill in the "L" section with something you learned today! Underneath this chart, write one way **you** can be a water protector!

K What I know	**W** What I want to learn	**L** What I learned

How can you become a water protector?

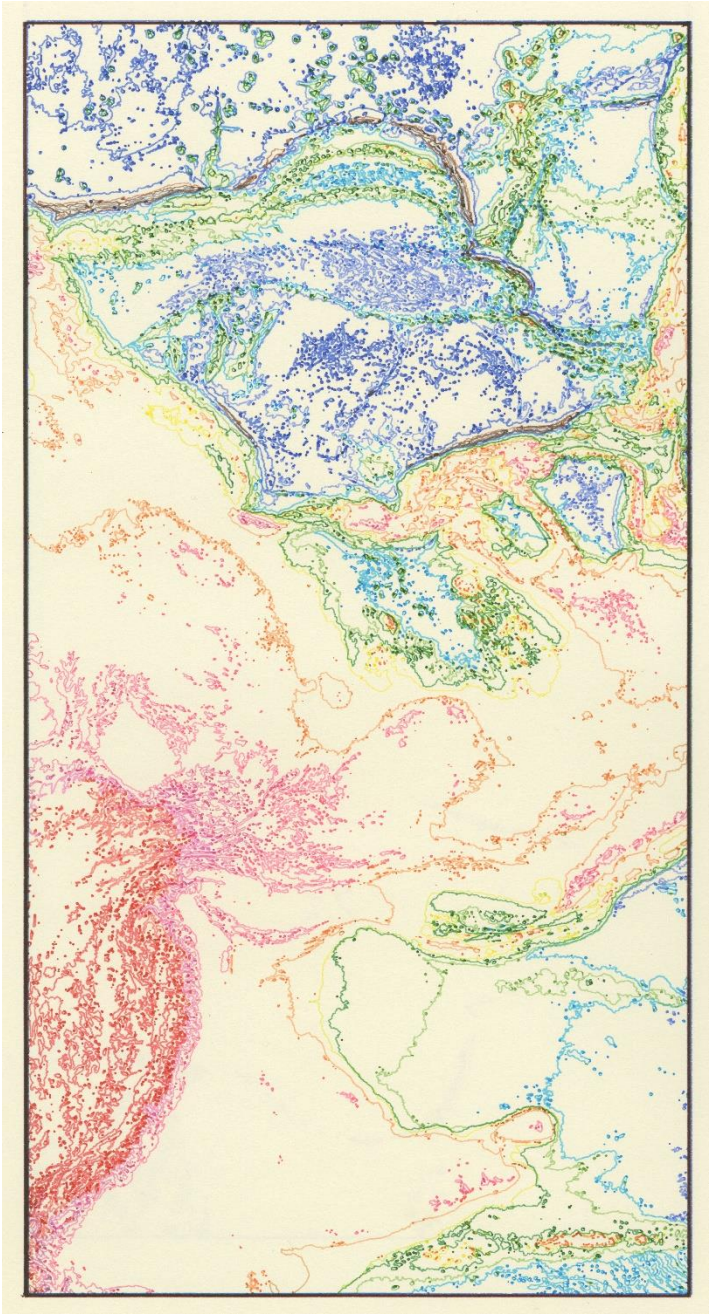
_____

_____

_____

_____

Selected Work from Volume 1, Issue 1



Abhishek Thapa: Axidraw drawing with ballpoint pen

Pragya Pahari: “Clean Water” (VR drawing)

Koty Kurtz

The Threat of Depleting Aquifers in the United States from Unsustainable Practices

When my family moved to the small village of Barryville, New York, we lived in a house with many problems. One major problem was having both too much water and not enough water. The topsoil always had very saturated soil. The neighbor's yard was always so saturated with water that water-resistant shoes were required to walk across it to keep our feet dry. Even in winter, the audible crunch upon stepping on the soil could be heard not just from the frozen grasses, but from all the water frozen within the soil. Often times during rain, water had nowhere to go except into our basement. Despite living on the top of a hill, the basement often flooded. Our family items that were not on wooden pallets were often ruined.

You would not expect a lack of moisture in the water table here, but there was. Using too much water would cause the well to dry up. For the first six years we lived here, my mother would have to stay up late doing the dishes and laundry so that the water could build up enough for everyone to have a shower in the morning. She would use the water late at night for the washing machine and filling the sink, then she would leave it alone and this would allow the water to build up enough for us to have showers in the morning. We had to buy bottled water, as water was not something that was always available. It became normal to see my father wake me up for school most mornings because my mother was sleeping after staying up so late, and it also became normal to constantly buy bottled water. Yet, the question remained: what was the cause of the well drying up?

The reason the well was drying up was because the aquifer was too stressed to support our needs. Aquifers are stores of water in the soil. As water precipitates onto land, it percolates down into the soil, building up over time. We drill wells into the soil and obtain this water for our own domestic needs; however, throughout the

United States our current usage is not sustainable. The United States Geological Survey has a section dedicated to observing the country's groundwater status ("USGS Groundwater"). One map shows wells with low water levels that have been consistently low for at least ten years. These points indicate areas that must find another way to sustain themselves. Some of these areas with many depleted wells include: a majority of Nebraska, southeastern Idaho, western Utah, eastern Arkansas, southern California, central Maryland, and Nevada ("USGS Groundwater"). But as my family experienced firsthand, local aquifers in water rich areas like the northeast can also become depleted.

One region that has become synonymous with water controversies is Las Vegas, NV. The Las Vegas metropolitan area includes the city itself and the immediate area outside city limits. This extensive area encompasses over 2 million people ("Las Vegas"). Las Vegas has a few sources of water available to it. There is the water in the Colorado River basin ("Nevada Water Facts") and the large amount of water in Lake Mead, which is contained by the Hoover Dam. Due to increasing populations and drought, water levels have been decreasing. In just a couple years, Las Vegas may have to simultaneously deal with a lack of water and a lack of electricity, as there may soon not be enough water to power the hydroelectric dam ("Metropolitan Board"). In order to secure a supply of water, Las Vegas wants to build a 300-mile pipeline into another aquifer. This other aquifer is the home of Baker residents. Baker, NV, only has a population of 150 people. These residents fear that if the pipeline is approved, they will also lose their water supply ("Las Vegas Bets"). Calculations predict that without the pipeline the people of Las Vegas will run out of drinking water in 20 years ("Las Vegas Bets"). The easy solution would be to build the pipeline, but it is not the right solution.

The reason aquifers around the world are decreasing is because of the slow replenishment of the aquifers. While water is regarded as a renewable resource, it is not unlimited. In addition not all water resources are renewable. Due to their snow recharge, aquifers are considered nonrenewable resources (Gleick and Palaniappan). This is due to their slow recharge as well as possible

compaction from overuse. If all the water is removed from the aquifer, the soil can be compacted preventing any recharge from occurring. Similar to “peak oil,” there is also “peak water.” There is a limit to the water that can be obtained from a source (Gleick and Palaniappan). While aquifers can recharge, the rates are variable, and there are many factors that decide this. A study conducted observed the Gulf Coast aquifer recharge rate. Fourteen different wells were observed, and recorded rates ranged from 0.1 to 7.2 inches per year (Oden and Truini).

Aquifers take a long time to recharge, yet our actions are slowing recharge further. For example, as we lay down more concrete and other impermeable surfaces, water is prevented from even reaching the soil, preventing recharge. We can see these patterns on the SUNY Oswego campus. To the south of Lanigan Hall, there is a large section of concrete, commonly referred to as “The Sundial” that prevents water from reaching the soil. This is my third semester here, and I have seen it utilized by two events, and in both cases the amount of people utilizing the space does not justify the amount of concrete used. Not only is the concrete slowing the recharge rate, it is also carrying pollution directly into Lake Ontario. Another way to slow the recharge rate is through climate change. We are observing more intense rainstorms. If high volumes of water are dumped on land in short intervals of time, water doesn't have time to soak slowly into the soil. The water is forced to run downhill into local watersheds, and this rate of water flow increases with the amount of impermeable surfaces. This excess water never enters the soil and thus is also unable to recharge the aquifer (Rathay). Some areas with depleted aquifers may be able to use the groundwater efficiently and be able to recharge their aquifers. People in highly stressed areas like Las Vegas and other areas of the southwestern United States may have to move, as such an arid environment cannot support such a large population.

The first remedy to this problem would be to educate people on using their water in a more sustainable way. According to Ali et al, a majority residential water usage is used to irrigate their lawns (169). These species require great amounts of water to thrive. A better usage would be using species that use less water. This would

decrease the water usage and allow more people to live sustainably in a given area. If people want to continue to live in arid regions, water is essential -- green lawns are not.

The problem isn't just limited to arid areas though. It also affects the Great Lakes region. The Great Lakes hold 21% of the world's fresh water, and this is 84% of the United States' fresh water supply (Bianco). If arid regions continue to use up their water stored in aquifers, they will look towards the Great Lakes. In fact, it is already happening, and it is not just the people living near the lakes contributing. Nestlé is already threatening our aquifers. The US and Canada made an agreement to regulate the water usage within the Great Lakes watershed. This agreement is known as the Great Lakes Water Quality Agreement and limits the usage of water from the Great Lakes ("Great Lakes Water"). However, there is a loophole to this agreement. You are not allowed to remove water from the Great Lakes, unless it is in a container of 5.7 gallons or less. So as long as Nestlé drills a well into the watershed and bottles the water, they are allowed to ship it out of the watershed (Bianco). Even worse was that Nestlé was able to get a permit to increase the amount of water they can extract to 400 gal/min. Nestlé is making a short-term profit, but we will be in for a long-term suffering.

My mother had to endure six years of staying up late to use the water before a new well was finally built. But there is only so much water in the aquifer, if we cannot use water more sustainably then a lot more people will have to endure even worse conditions. My family had to use bottled water regularly as we had a water shortage on our property. However, this bottled water would be coming from someone else's aquifer. This demand would increase pressure on that aquifer increasing the water withdrawal to support people that need bottled water. If this demand is too great then the aquifer won't be able to support the local population that lives there. Companies like Nestlé will move on to another aquifer forcing the local populations with their depleted aquifer to either move or also buy bottled water continuing the cycle. This scenario can also be the fate of the Great Lakes region. The Great Lakes are the largest source of freshwater in the United States, it creates a large target for companies like Nestlé. If the Great Lakes are not protected now,

then in the future, residents of the Great Lakes may be forced to buy bottled water as well.

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Jenna Galeotti, Kyle Hollowell, and Aaron Shopland

A Nuclear Power Plant's Effect on Freshwater

Approximately seven miles northeast of Oswego, New York, the Nine Mile Point Nuclear Generating Stations, or better known as Exelon, is found in the town of Scriba. It contains two boiling-water nuclear reactors, Unit One, which began operating since 1970 and Unit Two which began in 1987 (Exelon, 2016). Exelon has become one of the largest competitive United States power generators and has been a part of Oswego, New York for almost forty years. Exelon works in every stage of the energy business such as power, generation, competitive energy sales, transmission and delivery (Exelon, 2016). Both reactors are powered by generators which are capable of supplying enough carbon-free electricity to power more than two million homes in the United States.

Today, Nine Mile Point Nuclear Station Unit One is the oldest operating commercial boiling water nuclear reactor in the nation. Due to continuous technological advancement and equipment, Unit One has been more reliable over the years and has been performing at drastic levels of efficiency (Exelon, 2016). Niagara Mohawk Power Corporation president James A. O'Neill expressed that "This nuclear plant, unlike fossil fuel plants, does not contribute to air pollution by emitting by products of combustion - an omen of things to come from nuclear energy in New York." Compared to most industrial power plants, the nuclear station is a clean operation using freshwater from Lake Ontario which does not cause any pollution to the environment. Nine Mile Point was designed to avoid any negative impacts on water quality in Lake Ontario or aquatic life (Reitz, 2018).

Due to economic conditions in 2016, the plant was on route to shut down by January 2017. Throughout 2016, former plant owner Entergy began discussing a deal with Exelon Generation, the owner of the largest nuclear energy fleet in the nation, to assume ownership of the plant to keep it operating. To help this transaction

Andrew Cuomo, the Governor of New York, pushed to adopt a Clean Energy Standard that would benefit the state's nuclear power plant. The Clean Energy Standard is "the most comprehensive and ambitious clean energy goal in the state's history. It is designed to fight climate change, reduce harmful air pollution, and ensure a diverse and reliable low carbon energy supply" (New York State Research and Development Authority, n.d.). The passing of the Clean Energy Standard allowed the plant to continue operating past January 2017.

Currently, Exelon's nuclear power plant at Nine Mile Point is doing the most to keep their fresh water use clean so it does not affect the ecosystems surrounding the lake. The two different reactors use the fresh water differently, but have precautions to ensure the safety and purity of the water and emissions.

Both reactors draw water in from the shores of Lake Ontario in Scriba, New York. Unit One of Nine Mile Point does not have a cooling tower. The water gets pulled in from the lake, cools off the equipment, and is then sent through a series of cooling chambers before returning to the lake. Nothing is added or removed to the water besides heat. This reactor has a series of screens throughout the intake portion that filter any substances from the fresh water before entering the system. This ensures that fish and wildlife, along with other debris, are not sucked into the pipe and heated with the water. Occasionally, an eel or small fish enters through one of the first screens, but the remaining filters get finer and finer, until the water is pure for the system.

Also, the water returning to the lake is closely monitored and the temperature is regulated, so it does not affect the ecosystems it is returned to. The United States Nuclear Regulatory Commission, or U.S.NRC, has set standards on the amount of heat that can be returned to the lake in this type of reactor (United States Nuclear Regulatory Commission, 2019). The returning water can be no more than thirty-five degrees Fahrenheit warmer than current lake temperature. Anything hotter than that may negatively affect the wildlife or plant life in the surrounding area. At Nine Mile Point, they have precautionary measures in place to guarantee the compliance with that regulation. If the water returning reaches

thirty-three degrees higher than current lake temperature, then the intake of water is slowed or stopped. This allows water more time in the cooling chambers and ensures conformity to the requirements.

Unit Two at Nine Mile Point does have a cooling tower that can be seen for miles around. At this reactor, the water is brought in from the lake with the same precautionary filters as Unit One. In this case, the water is used to cool the machines until it reaches its boiling point of 212 degrees Fahrenheit. At that point, the water turns to vapor and is emitted out through the cooling tower as a gas. As explained by one of the engineers, Unit Two is like a pot boiling on the stove. Nothing is added to the water as a liquid, so nothing travels into the clouds as a vapor. It is a sped up version of the water cycle.

Unit Two monitors the output as well, even though it does not reenter the lake. A threshold has been set for the amount of steam leaving the tower and cannot exceed a certain gallons per minute as set by the U.S.NRC. Currently, Nine Mile Point sends about 640,000 gal/min through their cooling tower (Hakan, 2016). This is a safe amount that can be diluted into the atmosphere, without causing excess precipitation to neighboring ecosystems.

Nuclear energy companies are heavily regulated, especially in New York State, and it is the opinion of an Excelon worker that regulations on this industry are strict. This same employee also claims that complying with all of these regulations costs companies a lot of money. Some of the regulations that companies like Excelon have to comply with are put into place by the United States Nuclear Regulatory Commission (U.S.NRC). The U.S.NRC is the Federal agency that is responsible for protecting the health and safety of the public and the environment by licensing and regulating the civilian use of certain radioactive materials (U.S.NRC, 2019). A significant regulation the NRC sets that greatly affects nuclear plants is their limit on the temperature of cooling water before it can be emptied into a body of water. As stated before, the maximum temperature the water can be is thirty-five degrees Fahrenheit. Some nuclear plants across the country have had to receive permission from the NRC to increase the maximum temperature. They found this necessary because global warming is increasing the temperature of

water, causing plants to hit the limit more often (Lydersen, 2016). Nuclear power plants are also required by federal regulation to have an emergency supply of water that can continue to cool the plant for at least thirty days (Union of Concerned Scientists, 2013).

Nuclear power plants saw dramatic changes in the safety standards and regulations after the Fukushima accident in Japan in 2011. In September of that year, the International Atomic Energy Agency (IAEA) Action Plan on Nuclear Safety was endorsed by IAEA Member States. This plan has resulted in international collaboration toward strengthening global nuclear safety. Changes implemented include the review of IAEA safety standards, the strengthening of IAEA safety peer review services, and an increase in the amount of safety peer reviews for operators and regulators. There have also been many measures taken that, "include carrying out 'stress tests' to reassess the design of nuclear power plants against site specific extreme natural hazards; installing additional backup sources of electrical power and supplies of water, and strengthening the protection of plants against extreme external events; and changes and reforms of organizational and regulatory systems" (Jawerth, 2016). Overall, the Nuclear Industry works together when it comes to safety and regulations. They are not really competitive, but cohesive in order to ensure the longevity of nuclear energy.

Exelon's nuclear power plant at Nine Mile Point is an efficient energy producer without any carbon emissions. The facilities are heavily dependent on the freshwater supply of Lake Ontario, but their operations try to reduce any effects they may have on the surrounding ecosystems. While in agreement with the Nuclear Regulatory Commission regulations, Nine Mile Point provides energy to thousands of people per year without having major effects on the lake or wildlife. This business is heavily monitored and regulated to ensure the continuation of those achievements.

Appendix

1. What is your business's background?

Nuclear energy

2. What is your business's environmental impact historically?

a. What is your business's impact on the environment now?

3. What laws and regulations does your business have to comply with?

NRC Regulations and NYSRegulations

4. How does that compliance impact your business?

It is heavily regulated, which is costly

5. Has your business ever violated any current laws or regulations?

6. How important is sustainability to your business?

7. Are there any recent changes in the law that challenged your business?

Fukushima in Japan, changed safety standards and regulations

8. What is your opinion about those that violate water laws and regulations?

9. Do you believe that there is a water crisis?

10. Do you have any concerns regarding the current amount of available fresh water?

11. Are you going beyond government regulations in efforts for clean water and air?

Yes, we take preemptive measures to ensure regulatory compliance

12. What is your company's mission with watershed management?

13. Do you adapt new and more efficient technology as it develops?

Yes

a. Are you creating new technology?

14. Do you think regulations on this industry are strict or loose?

The regulations are strict, especially in New York State

15. Is doing what's right for the environment optimal for your business? If not, what would you do differently?

16. Does your steam affect any other ecosystems or the water cycle?

No, just pure lake water. There are no other pollutants.

17. What are you doing now that is different than a year ago?
    Not much
18. What differences are you making compared to other industries?
    The industry works together for safety and regulations. It is not so competitive, but cohesive in order to ensure the longevity of nuclear energy.
19. Do you think what you are doing is more efficient than other industries?
    Yes
20. What is the biggest achievement you guys have made in efforts for clean water?
21. What were some of your biggest challenges last year and what did you learn from it?

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Rasheed Shabazz

The Pond

As a child, most of my summer afternoons were spent at the Central Park pond with my late grandmother and cousins. Growing up in East Harlem, New York meant that the lovely Central Park was within a walking distance. On days that were too humid to stay inside my grandmother would take us down to the pond. On our way there, she would buy us all jumbo popsicles that dripped down our wrists as we ate them. My grandmother was a sweet woman, one who always put her grandchildren first. Our days at the pond were spent feeding ducks and fishing. We would all toss pieces of bread at ducks calmly sitting on the surface of the pond. I watched as they swiftly snatched the bread pieces out of the water. Dragonflies hovered amongst cattail plants as the faint sound ice cream truck music played in the background. Seeing the ducks enjoy the bread brought me enjoyment, I often wondered how the bread tasted to them. On occasion, the aggressive ducks would chase us, seeking more bread. We ran around the pond, full of excitement and terror as the greedy ducks pursued. Besides the frequent chases, our time spent feeding ducks was the peaceful break that we all needed. Out of curiosity I decided to ask my grandmother one afternoon why we fed the ducks.

"We do it as an act of kindness," she said.

"What did the ducks do for us?"

"Being kind doesn't require a reason. We do kind things simply because it's right."

Her statement was short and simple, but it is a statement that has resonated with me since. It was a simple enough statement for a seven-year-old me to comprehend, and it remains the mindset that I have at nineteen years old.

When fishing, my cousins and I eagerly placed tiny pieces of hot dog on each of our hooks. We would beg our grandmother to let us dig in the dirt for worms to use as bait, she never let us. My summer afternoons spent fishing at the pond taught me the art of

patience and anticipation. I still remember the day I caught my first fish on my own. I was able to cast my fishing line out to a respectable distance, as a waited. I kept my eyes focused on the bobber, ready for even the slightest tug. After about 15 seconds, I felt a slight tug on my rod, then a strong tension. My cousins shifted their focus to me as I freeze with bewilderment.

"You've caught one. Reel it in!" shouted my cousin as she gripped my shoulder.

I bent my knees and braced myself as I furiously reeled it out of the water.

It felt great to finally catch my one on my own; I let out a sigh of relief as I cracked a cheeky smile. My grandmother helped me unhook the fish as we tossed it back into the pond. My cousins and I still fish at the pond on occasion. My grandmother has passed since then, but I shall never forget our beautiful summer days spent by the pond.

Victoria Armet

Backroad Crossing

The road that always floods when it rains
because it curves through a pond

(it's not a pond due to size
and connections slowly shifting the water back to the lake
to keep things moving
but it's not a lake due to the green of the ecosystem
and how it grows unruly without deep expanses of water
to break up its designs as it caters to the small creatures
who don't fear land despite the pain and guts
from the black unmoving lake and its hulking inhabitants
who fight without mercy and insist on photos)

where there once was a beaver slapping its tail
and turtles randomly appear as they make their way into our grass
to snap at our helping hands
that still holds frogs despite their lack of self preservation
as rain coaxes them from their mud homes to be crushed
beneath the tires that spin on the asphalt because the road is flooding.