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The Positives in Our Association

By Troy Larson

In the days prior to the Annual conference, I was asked quite a few times what my opening remarks would be when I became president during the awards banquet. I often responded that I was not going to prepare a speech, joking: "I do not know exactly how I will feel at the moment, so why should I predetermine my words?" Of course, I was in part being coy and having some fun with friends by being evasive so I could suggest that they will need to be in attendance to find out. I did have a plan but I also did talk freely about how I felt at the moment. I found myself grateful for my playful response to people because, in a moment where time passes too quickly, I had inadvertently set myself up mentally to take in the moment and I will cherish that moment forever. I did, however, have a message: "We have built something great, and we need to continue to care for it in the manner that we built it in order to continue to maintain and improve the Association."

I truly believe that CSWEA is a great organization and that there are many characteristics of CSWEA that deserve recognition and I took a few minutes to highlight a few, including:

1. **We are good at being kind and inclusive to our guests and new members, and this creates bonds that strengthen our organization.** I vividly remember discussions a couple of decades ago about my personal involvement with CSWEA. I was thrilled to learn how many different educational and vocational backgrounds were represented, allowing me to embrace my unique attachment to the organization without feeling like an outsider. If not for the words of encouragement from members who were already very involved, I am not sure how I know my experience would not have been as rich and rewarding as it has been. Please continue to make efforts to be warm and welcoming to all that grace us with their presence and encourage those among your peers to become involved with CSWEA.
2. **Our committees are incredibly important to the organization, providing value to other members and opportunities to committee volunteers.** For me, the WI Section Operations Committee has allowed me to grow friendships and gain information about key issues that relate to my job. In turn, we have produced seminars and solicitated award recognition for members outside of the committee. This is but one of dozens of examples where committees provide a cycle of value, and I highly encourage all to find a way to be more involved.
3. **We have a fantastic Executive Management Team in Mohammed and Amy Haque.** Their contributions to the Association are extraordinary and an integral part of aiding a succession plan

that produces a new president each year, and I am personally very grateful that they conduct themselves with patient professionalism throughout the entire year.

4. It is also important to **recognize the exceptional technical information that is provided through events at both the state and association levels.** The Technical Program at the Annual conference is outstanding. Web-based and single-day seminars help provide other levels of detail and opportunities to discuss niche and timely content. It is truly remarkable how many people network to provide value to these endeavors through technical expertise, organizational efforts, sponsorship, and other necessary efforts.
5. I think that one of the least obvious points that I made is how **CSWEA is great in part because there is a will to be better.** Some of this is institutional through events like CSX, where members come together to learn from each other and share ideas related to the form and function of our events. We have recently completed member surveys and are in the process of learning from the membership and will work to implement practical ideas from the information received. But in reality, the most important reason that we as an Association are good at improvement, is because it is a big part of who we are and why we came together in the first place.

The five items are five of many reasons we each have for our attachment to the organization. My primary purpose to highlight these positives is to ask everyone to reflect on how these attributes (and others) became valuable, and to remind everyone that they have a role in creating value for themselves and others. I see a bright future because I think that there are a lot of people that embody this reasoning and are committed to keeping us moving forward, and for this, I am grateful.

Thinking back to my opening remarks, I hope that I adequately admired Amy Underwoods presidency, as she was dignified and diligent and a pleasure to follow through the leadership progression. I hope that all in attendance knew how much I enjoy and respect the members of CSWEA, and that I feel very honored to be the President of CSWEA for 2024-2025.

In closing, thank you all for the opportunities that CSWEA has provided me for my own personal development. I am very excited for the year to come! CS

"Please continue to make efforts to be warm and welcoming to all that grace us with their presence and encourage those among your peers to become involved with CSWEA."

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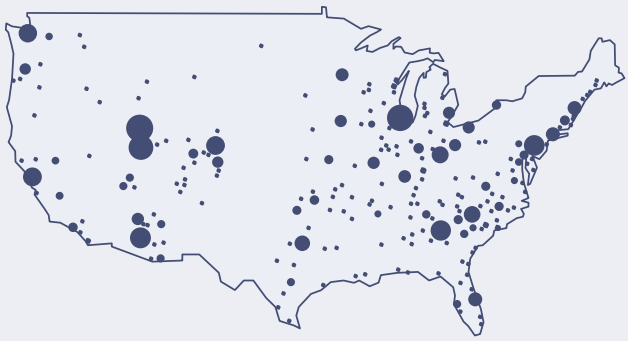

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Maximize the Value of CSWEA

Written by Anna Munson

Rich Hussey

Anna Munson

Many of us are juggling a lot of demands on our time each day. While being active in CSWEA and WEF produces additional responsibilities, I find it to be personally and professionally fulfilling. We know the benefits of participating in professional associations. These include the opportunities to develop a professional network, learn from others, build technical and non-technical skills, and support your professional community. Employers benefit when their staff are involved in professional associations too, but their budgets don't always allow them to compensate employees for time spent on CSWEA/WEF involvement. Thus, involvement in CSWEA and WEF requires commitment of personal time to the organization. To help balance things out, one could look for ways to maximize the value of your participation with the time you feel is available.

One way to do this could be to select one or two committees with CSWEA that you are most excited about. Each state section has several committees that gather people with similar interests. The time commitment for participating in committees varies widely. Some committees meet regularly for webinars or planning throughout the year. Conference planning committees meet regularly for several months up to the conference date, then don't meet again for a time. Other committees might meet only once a year. Each committee has a chairperson who can tell you about the committee's objectives and membership. Join a committee that fits your interests and availability.

Another way to maximize your time would be to be involved in a WEF Community. There are currently 26 Communities available in WEF, including those focused on technical areas such as air quality and odors, intelligent water technology, and municipal resource recovery design. Other Communities are focused on organizational topics such as membership and government affairs. Joining a WEF Community would facilitate networking with peers nationally and working on issues that impact the water industry across the country.

If the Communities do not represent a topic that you feel is important, you can apply to be a Delegate-at-Large. Delegates-at-Large represent a constituency of like-minded professionals to the House of Delegates. Mandy Sheposh is an active CSWEA member and a Delegate-at-Large for organizations with decarbonization commitments. There are 12 Delegates-at-Large from across the US in the House of Delegates. Unlike the Delegates representing Member Associations, Delegates at Large must apply for the role on the WEF website and are selected by a committee. The application process generally ensures that Delegates-at-Large are a passionate and energized group."

For experienced professionals, mentorship can have a big impact for a small investment of time. Mentorship is typically seen as an experienced professional providing a newer professional with guidance and encouragement and facilitating development of professional networks. While CSWEA does not have a formal mentoring program, there are opportunities to connect with students and new professionals at the Annual Conference. Some state section conferences hold Mentor Breakfast and Happy Hour events where an experienced professional can connect with new professionals. Experienced professionals can also serve as mentors to the CSWEA committees and State Section/Association leaders by providing information about how a task was approached in the past and what actions were successful or not helpful. All CSWEA leaders benefit from the perspective and experience of professionals who have held the positions before.

Rich Hussey and I are CSWEA's Delegates to the WEF House of Delegates. We have served in a variety of leadership roles in CSWEA and participated in a few WEF Communities. We've had the opportunity to be mentored by more experienced professionals. We can help you find the right fit within CSWEA and WEF. Contact us at *amunson@hazenandsawyer.com* or *rhussey@lai-ltd*. CS

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Let's Grow Together

By Patrick McNamara

Do you ever feel rejuvenated and totally exhausted at the same time? I do, and I think that is the tell-tale sign of another fantastic CSWEA Annual Meeting. There's a flow of energy you feel when you get to interact with familiar faces, and it feels like yesterday that the previous meeting occurred. Former CSWEA President, Tracy Hodel, noted that this is the best conference around and it feels like one big family. I agree, and family takes a lot of work and energy. The energy we all get out of attending the annual meeting and being a part of CSWEA is due to the enormous amount of energy that so many people put into it. We all reap the rewards of the collective input, and the joy so many people feel is the result of seeing the fruits of their efforts.

I remember my early events years ago and how nervous I was to walk into a room full of people that were so well connected, knew so much, and clearly felt like they belonged. It takes time to feel comfortable, and it takes people who welcome and mentor you to get that family feeling. If you are reading this, chances are you have been to an event, which now means you are a person who can invite and welcome others into the group. The mantra I'm following for this year is "*Let's Grow Together.*" It's very likely someone brought you into this organization. If each of us found two new people to bring into the organization we could triple our membership (reaching for the stars here), grow our family, enhance networking opportunities, and ultimately our profession as stewards for water. Let people know to click on "Join CSWEA" when they go to *www.cswea.org*. When you reach out to a potential new member, be sure to let them know of an event or committee they can join right away. Engaged members are much more likely to stay involved, and we have a lot of neat opportunities coming up in the WI Section of CSWEA.

What better way to get acquainted with our state section than a Brewers Game with tailgate on August 28? We had a great turnout last year. This event is labelled as a Young Professional (YP) event, but all are welcome. If you aren't a YP, come and bring some YPs so they meet other new faces. We also have a slew of seminars this summer. The Watertown Classic Collection System Seminar is on June 6, the Northwoods Collection System Seminar is July 25 in Marshfield, the Cross-Sector Wastewater Surveillance Workshop is July 24 and July 25 in Madison, the Industrial Pretreatment Seminar is August 7, and The Management Seminar is August 15. We also have the family-friendly planning event "CSWEA CSX" held in the Dells on July 18-19.

I look forward to growing our organization together and taking time to welcome and meet the new faces you bring in. I hope you get a chance to feel rejuvenated and even exhausted at times in all the good ways because there is nothing quite like summer. CS

Why Wastewater?

By Mark Enochs

How did you get involved in the water or wastewater industry? That's a great question to ask folks you work with. Wastewater isn't the most glamorous of career choices. The answers I've heard range from meaningful to glib to funny.

I recognized the importance of water at an early age. There is a creek in the woods behind our house where I grew up. As a little kid I spent a lot of time playing in the woods and the creek – damming it up, throwing rocks, walking in it, and walking along it. Once, while playing in creek, a friend of mine suggested we take a drink. It was crystal clear, cool, and flowing. Why not? I tried it – then was sick for two days. It was a learning experience for me. There had to be more to water than meets the eye. I learned much later that the creek got most of its flow from surface runoff, including areas where septic systems and leach fields were located. Yuck.

Going on backpacking and canoe trips also helped develop my perspective on water. We take drinking water with us when we backpack or properly filter it when we canoe. And we are very particular in how and where we manage our own waste. My experiences have shaped my perspective: the world needs good quality, drinkable water as well as proper waste management. The inspiration to do better with water and wastewater led me to seek and earn an environmental engineering degree.

My career has been devoted to using this education as well as my experience and perspective to improve water and wastewater. We in the water/wastewater industry are stewards. We don't own the water, the creeks and lakes, nor the piping and treatment systems, but we are responsible for taking care of them: planning, designing, building, operating, and maintaining them. It takes a lot of people doing many things correctly to produce well-treated wastewater and tasty drinkable water. It's this combined interest we share as an industry that gives meaning to what we do as a profession. CSWEA is a group of people with generally a similar interest – to do better with water.

To this end, the Minnesota Section has been busy creating opportunities for us to share ideas and lessons learned as well as strengthen our connections. The Innovative Approaches Seminar was held in St. Cloud on February 6. Attendance was up from prior years as was the interest in the variety of vendors and excellent technical presentations. Dozens of MN Section members represented Minnesota well at the May CSWEA Annual Meeting in Illinois. Committee reports and discussions during our Section Breakfast and Meeting showed great engagement and advancement of our combined efforts. The MN Section met in St. Cloud in June to coordinate and exchange ideas at the Minnesota Exchange (MNX). You're encouraged to participate in CSX, which is on July 18-19 at the Dells. Planning is underway for the Conference on the Environment to be held at the Minneapolis Convention Center on November 7. We have a great planning committee and welcome your participation. Contact me to get involved!

The Minnesota Section is working to improve its engagement in Operations Challenge. Early in my career I was part of an Ops Challenge team that competed at WEFTEC. I was the Process Control lead, and participated in the other events – Safety, Lab, Collection System, and Maintenance. This involvement broadened my perspective, increased my knowledge, and cemented the importance of having fun with great people while learning. It also inspired me to get a wastewater operator license. This is a great opportunity to be involved in helping people become better at what they do while representing the strong water/wastewater professionals of Minnesota. Eric Lynne of Donohue is the Minnesota Wastewater Operators Association (MWOA) Liaison with CSWEA MN Section – contact him to get involved (*elynne@donohue-associates.com*).

The MN Section has an energetic team of people involved in a wide range of efforts. We are organized by Committees. Check out the list of committees on the CSWEA website and contact the people listed to engage (*www.cswea.org/minnesota/about-us/officers-and-committee-chairs*). You'll be glad you did. CS

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Keep Up the Pace

By Christopher Buckley

Here's to another great year for the Illinois Section! The 2024 Annual Meeting in Schaumburg, IL had record-breaking attendance with loads of technical education, exhibitor showcasing, and general camaraderie with colleagues and friends. So, let's keep up the pace with another invigorating year of water innovation, education, and mentoring!

It is my honor to serve as the 2024/2025 Illinois Section Chair. I am excited to work with all of you to keep the excitement rolling as we head into the summer. Let's please take a moment to thank our immediate past chair, Jason Neighbors, for his hard work and leadership in the Illinois Section. Thank you, Jason!

In addition, I would like to thank all the committees for their hard work finding ways to promote and educate our group as well as mentoring the future of our industry. And none of this would not be possible without the hard work and dedication from our Executive Directors, Mohammed and Amy Haque.

Keeping up pace, we have many great events to choose from this year:

- First out of the gate was a CSWEA Webinar on June 10 about **Process Intensification in Water Resource Recovery Facilities.**
- Next is the **Central States Section Exchange (CSX)** at the Kalahari Resort in Wisconsin Dells, WI on July 18-19. This event brings members together to share and discuss ideas for strengthening the Association. All are welcome to bring your innovative ideas and openly discuss their possibilities for the future.
- The **Stormwater and Collection System Conference** will be held on July 31 at the NIU-Naperville campus. This high-quality event provides technical education, networking opportunities, and collection system Operator Training.

Speaking of operators, the **Operations Committee** continues its excellent training regimen with monthly scheduled Operator Training webinars. These webinars further operator knowledge, help prepare for that next certification or get in CEUs.

Also, the **Biosolids, Energy, and Environmental Resource Committee** (affectionately nick-named BEER Committee) will be planning its next annual seminar for November 2024.

These events are just a few of the many to come. After first of the year will be the Governmental Affairs and Laboratory andPre-Treatment Seminars.

Watch *www.cswea.org* for upcoming events from all of the committees. If you are interested in getting involved and don't know where to start, reach out to myself and or one of the committees that sounds interesting. I can speak from personal experience that it will be a welcoming environment and will open up opportunities to showcase your talents to help the section. You will also find lifelong friends and colleagues to help you throughout your career along the way. Networking is an invaluable tool and helps to make us all stronger.

I am looking forward to seeing everyone out there this year at one of the many meetings, events, or social gatherings.

Keep Up the Pace!
Christopher Buckley PE, BCEE CS

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97th ANNUAL MEETING

Flowing into the Future Recap

MAY 13-15, 2024 | RENAISSANCE SCHAUMBURG, IL

This year's meeting took place on May 13-15 at the Renaissance Schaumburg, IL. It was a fantastic opportunity to see old friends, meet new people, and celebrate our fellow water professionals. Thank you to everyone who attended and who helped make this conference a success!

Conference Highlights









Tuesday Awards Banquet

Passing of the Gavel/Red Suspenders
Amy Underwood, CSWEA President 2023-24 and Troy Larsen, CSWEA President 2024-25 performing the Passing of the Gavel and Red Suspender traditions.

Golden Manhole Society Inductees

Mike Holland announces Golden Manhole Society Inductees.

Golden Manhole Society Inductees (L-R): Kate Despinoy, Ifetayo Venner, presenter Mike Holland, and Jason Neighbors.

7S Society Inductees
Wade Lagle, Patrick McNamara, presenter Beth Vogt, Cody Schoepke, Ifetayo Venner.

Remembering Rusty Shroedel and Samidha Junghare

CSWEA Awards

WEF Service Award
David Arnott, WEF Delegate 2020-23

CSWEA Service Award
Amy Underwood, President 2023-24

CSWEA Service Award
Anna Munson, Minnesota Trustee 2022-24

CSWEA Service Award
Anndee Huff Chester,
Young Professional Representative 2022-24

Operations Award
Wade Lagle,
Urbana & Champaign Sanitary District, IL

Operations Award
Alex Krause, Fond du Lac WRRF, WI

Operations Award
Kelsay Van Deusen, City of Red Wing, MN

Collection System Award
Jason Neighbors, City of Lockport, IL

Collection System Award
Tom Dickson, Oconomowoc WWTF, WI

Gus H. Radebaugh Award
Patrick McNamara, Black & Veatch/ Marquette University, Zhongzhe Liu, California State University – Bakersfield, Taryn McKnight, Eurofins Environment Testing America, and Eric Redman, Eurofins Environment Testing America *Transformation of PFAS during Pyrolysis of Biosolids*

Water Stewardship Award
Megan Livak

Sustainability & Green Infrastructure Award
Brad Bennett,
Urbana & Champaign Sanitary District

YP of the Year Award (Minnesota)
Kaitlyn Hague

YP of the Year Award (Illinois)
Nick Domalewski

YP of the Year Award (Wisconsin)
Christine Hengel-Prom

Bill Boyle Educator of the Year Award
Walter McDonald, Marquette University

Academic Excellence Award
Connor Elens, Bradley University

Academic Excellence Award
Eric Faulkner, Northern Illinois University

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Academic Excellence Award
Mathis Lucet, Illinois Institute of Technology

Academic Excellence Award
Zhen Jia, Northwestern University

Academic Excellence Award
Saumitra Rai,
University of Illinois at Urbana Champaign

Kelman Scholarship Award
University of Wisconsin – Madison Megan Beaulieu, Anna Cardinal, Josh Nemser-Sher, Emily Strand, and Ethan Hanewall
Koshkonong Creek Watershed Flood Control

Water Environment Federation Awards

Laboratory Analyst Excellence Award
Maria Amundson,
City of Moorhead, MN

William D. Hatfield Award
Corey Bjornberg,
City of Rochester WR, MN

George W. Burke, Jr. Facility Safety Award
City of Hutchinson, MN

Arthur Sidney Bedell Award
Tracy Hodel, City of St. Cloud, MN

Mid-West Student Design Competition Awards

Global Water Stewardship Category (Overall Winner)
Marquette University
Ben Craighead, Veronica Bevan, Giuseppe Camarda, Maya Adelgren, and Ashley Tan
Sanitary Sewer and Treatment Design for Horquetas, Costa Rica

WEF Water Environment Category
Illinois Institute of Technology
Constantine Giattina,
Ryan Griepentrog, Judith Rackow,
Francis Gilleece, and Mathis Lucet
ChASM Project – Chatham Aqueous Stormwater Management

WEF Wastewater Category
Marquette University
Keagan Morgan, Zachary Molczyk,
Jessica Calteux, and David Zeller
Novel Pyrolysis of Municipal Wastewater of Solids for Energy and Biochar

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Awards Banquet Highlights











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5K Run/Walk

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WATER'S WORTH IT

THE 2024 YP SUMMIT:

YOUNG WATER PROFESSIONALS TAKING CARE OF BUSINESS

By Antônio Martins, Elizabeth Kramer, Lindsay T. Muth, Mohammed Sufiyan Saleem, and Rocio Durkot

The WEF/AWWA Young Professionals (YP) Summit is an annual meeting of young talents working in the water industry. Hosted in Portland, OR, this year's YP Summit was attended by more than 300 participants, including professionals from consulting companies, utilities, manufacturers, and universities. The event was divided into three days: the Pre-Summit Activity Day, Workshop Day, and YP Summit day. On the first day, YPs were invited to join one of the two free group tours in two different facilities: the Joint Water Commission (JWC) Treatment Plant in Forest Grove or the Clean Water Services' Fernhill Natural Treatment System (NTS). On the second day, participants had the chance to join either the WEF Emerging Young Professional Leaders workshop or the AWWA YP LEADER Training workshop. The third and last day was dedicated to the YP Summit itself.

We were all excited to attend the 2024 Young Professional Summit for multiple reasons. Our group comes from different backgrounds – from consulting firms to public utilities to universities – but we all shared a desire to network, connect, and take key information back to our organizations and CSWEA. Throughout the Summit, the importance having attendees from all fields within the industry was evident. Each year, CSWEA provides scholarships to help individuals such as operators, students, consultants and public utility representatives to attend the Summit. Attendance from diverse fields within the industry helps make the event more representative of the water industry as a whole and hear perspectives from those with varying backgrounds and experiences.

The first day of the WEF YP Summit was the WEF Emerging Young Professionals (EYPL) Workshop, Navigating the New Workforce. The workshop included modules on many important topics, such as: Modern Leadership, Evolving Workshops Challenges, Adapting to Today's Needs, and Setting Boundaries. The Modern Leadership module included the following topics: communication, learning from others and empathy, as well as motivation and self-confidence. The workshop included many interactive discussions during the different modules, which allowed attendees to share ideas and network with each other. Specifically, the Adapting to Today's Needs module encouraged attendees to discuss their "super skills" and double down on them in the future to fill gaps within our organizations.

The 2024 WEF/AWWA YP Summit theme was Taking Care of Business. The summit consisted of diverse and interactive discussions that set ideas in motion in young professionals for utilizing the information acquired to continue improving the water industry for generations to come. The summit had many valuable takes ranging from building new connections, inspiring personal experiences, a collaborative water circuit challenge and ending on a crowd favorite, an eye-opening panel discussion on the equity and affordability of water.

Our five most important lessons taken from the YP Summit are:

1. **Maintain a positive mindset for communication.** In order to effectively communicate with others, you need to learn about your own communication style, and how to speak with people who have different styles.
2. **Learn about yourself.** You need to know yourself, your unique skills and the

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CSWEA YPs attending the summit.
L-R: Mohammed Sufiyan Saleem,
Antônio Martins, Rocio Durkot, and Lindsay T. Muth.

The YPs at the Wetland Tour.

YPs at the summit. L-R: Mohammed Sufiyan Saleem, Antônio Martins, Rocio Durkot, Elizabeth Kramer, and Lindsay T. Muth.

Lindsay Muth loved Oregon.

value you bring to the industry, as well as your own interests and passions. This knowledge of yourself will help you focus on how you want to develop your job, your career and the water industry.

3. **Learn from others.** Developing relationships and forming a network of people that can teach and support you in different aspects of your life is an essential skill. Have empathy and open yourself up to other perspectives.
4. **Embrace opportunities.** The work that we do in the water industry can be easy to dismiss as "out of sight, out of mind." Don't lose sight of the fact that this work is also an incredible opportunity to do something valuable for people, the environment, and public health.
5. **Shape the future.** Together, invested people can shape the future of water with equity, the environment, public health, and sustainability in mind.

The YP Summit was a valuable learning opportunity. Strengthening communication, developing leadership skills, forging self-confidence and adapting to todays' workforce are valuable skills that YPs can incorporate into their own lives – and bring back to their workplaces to help others. The YP Summit is also a tool to help YPs see the range and extent of our industry, connect and focus on the future of the industry. Thank you to CSWEA for making our attendance possible, and to AWWA/WEF for creating workshops and Summit content. We strongly encourage YPs to apply for scholarships and attend future YP Summits by reaching out to CSWEA leadership and past attendees. Hope to see you there next year! CS

Water Week 2024: The DC Fly-In Recap

By Chris Tippery, P.E., ENV SP, Senior Project Manager, raSmith

The following report provides a summary of information gathered during Water Week 2024.

On April 8-10, Brandon Koltz, Adjunct Professor at Carthage College and owner of his own LLC firm, and I attended Water Week 2024 in Washington, DC, on behalf of the following organizations:

- Central States Water Environment Association – Wisconsin Section
- The Wisconsin Wastewater Operator's Association
- The League of Wisconsin Municipalities
- The Municipal Environmental Group (MEG) – Wastewater Division
- The Wisconsin Chapter of the American Water Works Association
- The Wisconsin Chapter of the American Public Works Association
- The Wisconsin Rural Water Association.

Water Week provides an opportunity for professionals to engage with our congressional elected and regulatory officials, discussing Wisconsin's needs and concerns. In preparation for Water Week, I reached out to all represented organizations and inquired of their discussion points with our congressional representatives. Wisconsin's needs are well aligned with those of the Water Environment Federation (WEF) and consist of funding, PFOA/PFAS, workforce development, and chlorides.

While in DC, Michael Mucha of the Madison Metropolitan Sewerage District, Brandon Koltz, and I met with staff from the offices of Senator Ron Johnson, Senator Tammy Baldwin, Representative Gwen Moore (District 4), and Representative Scott Fitzgerald (District 5) to discuss national and Wisconsin-specific issues. This discussion highlighted the topics of additional funding, PFOS/PFAS, especially within biosolids and their disposal, workforce development, and chlorides.

Regarding the current and future alignment of Congress in the fluctuating yet equivalent political environment, the current slim majority for either political party within each chamber (Senate or House) will likely continue. For Wisconsin, the Supreme Court's newly redrawn Senate and Assembly maps may provide more equity within the State Legislature, but with the initial election occurring in November, the effect of these new maps remains to be seen.

We attended the Stormwater Policy Forum discussion focused on the *Water Resources Development Act* (WRDA) legislation funding, which is expected to pass Congress this summer, and emerging regulatory issues. The Environmental Protection Agency (EPA) is expected to address PFAS for aquatic life after promulgating the drinking water standards released in April 2024. Funding has been provided for the EPA to create Stormwater Centers of Excellence, which will address environmental and regulatory concerns, technical assistance for communities, and funding equity. In addition, the EPA is considering water quality criteria for 6PPDQ-quinone, which is found in vehicle tires and has been discovered to be toxic to some species of fish, notably salmon.

In addition, there is a growing push for the Energy-Water Nexus, which is a term applied to the relationship between the water and energy industries. Water and wastewater utilities are encouraged to develop more energy efficient policies and practices, potentially in response to climate change concerns, but also to develop a collaborative approach with energy utilities to provide strategic services to communities, meaning to locally align demand with availability and plan regionally.

Funding

The Bipartisan Infrastructure Law (BIL), or the *Infrastructure Investment and Jobs Act* (IIJA) of 2021, has greatly increased funding for water and wastewater projects nationwide with $55 billion allocated, $13 billion spent to date, and $8.5 billion appropriated in 2024 with $4.4 billion dedicated to combined sewer overflows (CSO). The *Water Infrastructure Financing and Innovation Act* (WIFIA) funding also provides $19 billion for the water and wastewater industry.

In Wisconsin, the BIL funding is managed through the Wisconsin Department of Natural Resources (WDNR) through the State Revolving Fund (SRF) known as the Safe Drinking Water Loan (SDWL) and Clean Water Fund Loan (CWFL) programs. Per the WDNR, there has been an increased demand for funding in Wisconsin, potentially for principal forgiveness (PF), but also due to aging infrastructure and ongoing operational, maintenance, and enforcement needs. The 2024 Wisconsin

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BIL funding has already been allocated, and the demand is expected to continue to exceed available funding through the duration of the BIL funding period, 2027. For that reason, we continue to advocate for more funding for the SRF programs.

Earmarks, or congressionally directed spending, directly appropriate federal funds to approved projects. This benefits the local community, but also reduces the annual federal capitalization of the SRF program. Congressionally directed spending is not being appropriated in addition to SRF funding; it actually erodes it. More private investment is needed in water and wastewater as approximately 26% of all funding comes from the federal government.

The Chevron Doctrine, based on the 1984 US Supreme Court case, Chevron v. Natural Resources Defense Council, provided governmental agencies the leeway for interpretation of federal laws. The Supreme Court is now considering overturning the Chevron Doctrine. The concern is that each new federal administration may be able to interpret federal laws differently, which may usher in system shocks and implement massive environmental law change every four or eight years. The court's ruling could have ripple effects across the federal government, where agencies frequently use experts to interpret and implement federal laws.

PFOS/PFAS

This contaminant may be the initial, of potentially many, harmful chemicals and pollutants for human consumption and the environment. The EPA standards for PFOA/PFAS in drinking water were recently released – 4.0 parts per trillion (PPT), or nanograms per liter (ng/L). This supersedes the previous rule, passed by the Wisconsin DNR, of 70 PPT (or 70 ng/L). The EPA will be addressing national discharge limits, monitoring the public health and the environment, and addressing PFOS/PFAS in biosolids.

It is estimated that 20% of our PFOS/PFAS exposure is through water, and the remaining 80% is through other sources in our environment. The EPA will be conducting more research and development, as well as a risk assessment regarding the acceptable levels of PFOA/PFOS exposure in the environment.

For Wisconsin surface waters, PFOS was established at 8 ng/L in all waters without mixing zone dilution considerations. The Wisconsin surface water PFOA standard, which is based on drinking water protection, was tiered as follows: 20 ng/L (20 PPT) in waters that are public drinking water sources and 95 ng/L (95 PPT) in all other waters to ensure protection against the incidental ingestion of water by children during recreation.

The Wisconsin DNR was in the process of establishing groundwater standards, but the treatment costs exceeded the legislature-approved, allowable costs of $10 million over a two-year period. Therefore, the WDNR groundwater rule-making efforts were paused until the legislature approves the cost or process. Likely, the groundwater process may have to follow the EPA drinking water rule, but this has yet to be determined.

PFOA/PFOS in biosolids was also a prevalent topic. In August 2022, the EPA designated PFOA and PFOS as "hazardous substances" under the *Comprehensive Environmental Response, Compensation & Liability Act* (CERCLA, also known as the Superfund Law). Water, wastewater, and stormwater utilities are requesting that Congress provide a waiver for the transmission and presence of PFOA/PFOS within their flows, as these utilities merely convey or receive these products. Private companies created these products, and they should be the ones held responsible for their treatment and removal from the environment. Notably, PFOA and PFOS reside within wastewater biosolids, and there are concerns regarding the acceptance of biosolids for land application.

Expanding upon this point, companies who create chemicals for public use should evaluate the lifecycle of their product, from its creation and manufacturing to its disposal and return to the environment. They should be responsible for all costs from the use of their product, and if these costs exceed their desired profit margins, then they should not bring the product to market. In this way, manufacturing will be held accountable, and we will hopefully prevent the next environmental concern.

Workforce Development

Nationwide, the concerns are regarding attracting more and diverse talent into our industry. The current push is for educated staff with a higher degree of flexibility and adaptability being able to perform more tasks with fewer staff, which will be a requirement for our industry's future.

Chlorides

Especially in Wisconsin where winter snow and ice are prevalent for months, chlorides can end up in the waterways through stormwater or water softener discharges. Excessive chloride discharges can increase the salinity of our freshwater, which is harmful to the environment and animals. The EPA has developed acute and chronic water quality criteria, to be implemented into practice by each state as mandated by federal law. In many cases, states seek criteria variance requirements and develop their own site-specific criteria for less stringent standards, requiring EPA concurrence. Each state may establish water quality criteria more stringent than the EPA criteria, but routinely request less stringent standards due to the cost or complexity of compliance for a particular pollutant.

Congressional Visits

Informational material was available from WEF, National Association of Clean Water Agencies (NACWA), and other water organizations regarding funding, emerging contaminants, and other issues. A stormwater informational brochure was prepared by WEF and the National Municipal Stormwater Association.

The DC Fly-In event provides an annual opportunity for Wisconsin's water and wastewater industry experts to advocate for our needs and express our concerns to our elected officials. If you are interested in attending next year's Fly-In event on behalf of Wisconsin, please contact Chris Tippery at either *chris.tippery@rasmith.com* or 414-267-7335. Brandon and Chris would like to thank the Central States Water Environment Association – Wisconsin Section for their continued support by allowing us to attend the annual Fly-In. In addition, we would like to acknowledge WWOA's financial contributions towards the 2024 Fly-In. CS

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MIDWEST DESIGN COMPETITION

THE 6TH ANNUAL MIDWEST STUDENT DESIGN COMPETITION

By Alexis Countryman

The 5th Annual Midwest Student Design Competition (MSDC) was held on April 8, 2024 at the Monona Terrace in Madison, WI. This year the competition represented the work of 55 students from 13 competition teams and a total of five states. The MSDC promotes "real-world and hands-on" design experience for students interested in pursuing education or a career in the water and wastewater industries. As a past five-time competitor, I personally can attest to the career-altering impact this competition can have. I had the opportunity to meet my boss through the competition.

Presentations took place in two rooms at Monona Terrace and ran from 9:30 am to 2:30 pm. The competition presentations were followed by a career fair, winner announcement ceremony, and – new this year – a MSDC dinner.

Student competitors at the MSDC can compete in up to three categories: Water Environment Federation (WEF), Water Environment, WEF Wastewater, and Global Water Stewardship (GWS). As winners of the WEF categories, teams are given a stipend to travel and participate in both the WEF Student Design Competition and WEFTEC. Winners of the GWS competition have the opportunity to travel to Costa Rica. In their travels, students have the opportunity to present their solutions to the community members for which they designed the wastewater treatment solution.

Each WEF Member Association (MA) has the ability to send one team for each WEF category. We have been expanding our competition to universities outside of CSWEA states. Several MAs gave permission for their students to compete at the MSDC. We expanded our outreach efforts significantly with the growth of the MSDC committee and the support from surrounding MAs. This year the competition included entries from Missouri Water Environment Association (WEA) and Indiana WEA. This year a total of four teams between the three MAs are eligible to compete at the WEF Student Design Competition, including IIT and Marquette for CSWEA, Notre Dame for IWEA, and Washington University at St. Louis for Missouri WEA! If you plan to attend WEFTEC, consider attending the competition Sunday before the event to support these incredible students.

The competition could not be such a success without the contributions of many incredible people. First, a huge thank you to the CSWEA Student Design Committee and the GWS Community Design Committee for all their time and effort for the entire year. I could not be more grateful for Christine Hengel-Prom (my fantastic co-chair), Joe Lapastora (the ever-supportive past chair), and Jonessa Ruhl (the current GWS Design Competition Chair).

Committee Members in Attendance (L-R): Rahim Ansari, Ethan Yen, Lance Langer, Christine Hengel-Prom, Jonessa Ruhl, Alexis Countryman, and Jasmin Bait.

Great job to all the teams who competed this year, including teams from the following schools:

- University of Wisconsin - Madison
- Marquette
- University of Wisconsin - Platteville
- Milwaukee School of Engineering
- Illinois Institute of Technology
- Notre Dame
- Washington University in St. Louis
- University of St. Thomas
- St. Cloud State University

Thank you also to our judges: Mohammed Haque (Northern Moraine WRD), Liz Heise (Trotter and Associates, Inc.), Mike Holland (Flagg Creek WRD), Bill Krill (Krill EMS), Andy Burt (Ruekert Mielke), Troy Larson (Strand Associates), and Greg Gunderson (MSA Professional Services). We are lucky these fantastic professionals took time out of their days to impart knowledge upon competitors.

As well, many thanks to this year's sponsors: University of Wisconsin – Madison, MSA Professional Services, Ruekert Mielke, Strand Associates, Trotter Associates, Inc., Black & Veatch, Brown and Caldwell, Boerger, Dahme Mechanical, Carollo, and Grundfos. Without them we couldn't support students in the attendance of the in-person event.

Finally, thank you to all the students who worked so hard to participate in the competition. We were impressed by your knowledge and professionalism. I am thrilled knowing you will soon be joining the industry. Prospective companies stay on the lookout for these amazing students!

Thank you to all who were involved in making this competition a success. Let's continue the momentum for next year's 6th Annual MSDC!

We could always benefit from another committee member. If you are interested in benefiting students through this competition, please reach out to Alexis Countryman, *acountryman@msa-ps.com* or Christine Hengel-Prom at *hengelpromc@bv.com*.

If you are interested in supporting student advancement through sponsorship, please reach out to either Alexis Countryman at *acountryman@msa-ps.com* or Christine Hengel-Prom at *hengelpromc@bv.com*. CS

IIT WEF Water Environment CSWEA Winners. Team Members: Judith Rackow, Knowlen Giattina, Ryan Griepentrog, Francis Gileece, and Mathis Lucet.

Marquette Global Water Stewardship Overall Winners.
Team Members: Ashley Tan, Maya Adelgren, Giuseppe Camarda, Veronica Bevan, and Ben Craighead.

Marquette WEF Wastewater CSWEA Winners.
Team Members: David Zeller, Jessica Calteux, Zachary Molczyk, and Keagan Morgan.

Washington University Missouri WEF Wastewater Overall Winners.
Team Members: Sean Hwang, Ariel Richards, Yue Rao, and Jiasi Sun.

Notre Dame Indiana WEF Water Environment Overall Winners.
Team Members: Andrea Reisinger, Patrick Murray, Brooke Wilkinson, and Annie Lang.

GLOBAL WATER STEWARDSHIP

MIDWEST DESIGN COMPETITION

Midwest Student Design Winner –

GWS Overall Category: Marquette University

On April 8, 2024, a team of five seniors from Marquette University competed in the CSWEA Midwest Student Design Competition in Madison, WI. The team won the Global Water Stewardship category with their proposed design of a wastewater treatment facility in the community of Horquetas, Costa Rica.

MARQUETTE UNIVERSITY

The design team is comprised of five undergraduate civil engineering students from Marquette University graduating in 2024. The team represents a wide range of subdisciplines in Marquette's Civil, Construction, and Environmental Engineering department: Ashley Tan, Ben Craighead, and Maya Adelgren in environmental engineering, Veronica Bevan in structural engineering, and Giuseppe Camarda in construction engineering. Matt Castillo from MSA Professional Services Inc served as the team's mentor, along with faculty members at Marquette University.

In winning the competition, the team earned a trip to Costa Rica to visit Horquetas and present their design while traveling with other professionals involved with Global Water Stewardship (GWS).

Sanitary Sewer and Treatment Design for Horquetas, Costa Rica

Problem Statement

The community of Horquetas is located in the Heredia province of Costa Rica, just northeast of the capital of San Jose. The community has experienced significant growth recently, and also has seen a substantial increase in eco-tourism to nearby national parks. Horquetas is home to approximately 38,000 full-time residents and 180,000 tourists per year (in 2024). The community is currently facing challenges with existing septic systems; most homes and businesses currently utilize septic tanks, but a lack of maintenance and poorly draining leach fields has resulted in significant problems for sewage management. The community desires a centralized wastewater treatment facility capable of treating sewage for the entire community, as well as the tourist population. The community requested an affordable system, with a budget for operations and maintenance (O&M) costs per capita set at 10,000 Costa Rican colones, or $20 USD per month. The design of the system was also to minimize capital costs, electricity usage, and impact on the community and environment. The system must meet the specific effluent standards, while all fitting on a single parcel of land. The team provided three alternative designs for the system, as well as selecting an outfall location and treatment site from three given alternatives. Through careful consideration of community requests and resources, the team selected a single alternative for the treatment design, with a 20-year design lifecycle. With the rapid growth of the community of Horquetas, and the careful design of the treatment system by the team, Horquetas will continue to grow and prosper, becoming healthier than ever before.

Objective

The goal of this project was to design a wastewater treatment system for the community of Horquetas, Costa Rica. The design factored in community desires such as ease of maintenance and minimizing costs while also negating the environmental impact of the system. The chosen design meets all effluent standards, and has been designed to accommodate future population and tourist growth.

Design Factors and Constraints

The team was presented with several significant challenges and limitations in the design of the treatment system. They were challenged to design a system capable of handling the volume of flow while also keeping costs, environmental impact, and maintenance to a minimum.

Simplicity

The community requested the chosen design to be as simple as possible in both construction and maintenance. The power grid in the community is still in development, and thus an option that minimized power consumption was important. The design also prioritized ease of construction, by using simple designs and limiting the use of specialized equipment.

Cost

Capital and operation and maintenance (O&M) costs were minimized in the design through the use of low-energy treatment methods, and a simple, gravity-fed sewer system.

Footprint

The chosen design heavily relies on large area ponds for treatment, and maximizing the space available was paramount in allowing for the design to work.

Environmental Impact

The community relies on eco-tourism for much of its economy, and thus selecting a design that minimizes odor and other environmental damage was heavily considered.

Design Flowrates

To determine the flowrate of the system, the team first estimated the population of Horquetas in the design year (2044) using Costa Rica census data and the logarithmic method, giving an estimated future population of 63,000 people and future tourist population of 250,000 tourists per year.

The total flowrate was calculated from three sources: domestic flow, commercial flow, and infiltration. Domestic flow was informed by the population estimate for the design year. Information provided by GWS indicated the water consumption was

Table 1: Design parameters and flowrates.

Design Parameters for 2044		
Population	63,000	people
Tourism	250,000	people/yr
Daily water usage	77.38	gal/cap/day
80% of water use is discharged to sewer		
Flowrate		
Domestic	3.97	MGD
Commercial	0.04	MGD
Infiltration	0.69	MGD
Design flow	4.7	MGD
Peak flow*	13.0	MGD
Seasonal Adjustment		
Peak precipitation infiltration	0.4	MGD
Design flow, wet season	5.1	MGD
**Peaking factor of 3, excluding infiltration*		

77.38 gallons per capita per day. Commercial flow was found by determining the number of services in the design year. The population growth percentage of 37.5% was applied to the current number of services, 74, for a future estimate of 127 services. Infiltration flowrate varies with rainfall, and since Horquetas is located in a region with heavy rainfall, analyzing seasonal precipitation data was essential in the project design. Weather data from 1991 to 2021 was used to investigate the seasonal variations in rainfall by month, and from there the corresponding infiltration rate was then calculated.

Treatment Alternatives

The team developed three alternatives for the wastewater system before selecting a final design. Alternatives needed to meet design constraints and treatment standards. The team designed three complete treatment trains with primary, secondary, and tertiary treatment, then selected the best alternative that prioritized the needs and requests of the community.

Trickling Filter

The first alternative was a trickling filter system. Trickling filters (TF) consist of a tower-style cylindrical filter bed made up of permeable media. Wastewater is sprayed from several nozzles on a rotating distributor arm that spans the entire diameter of the filter and sits at the top of the media bed. A biological film, made up of a variety of microorganisms, builds up on the media as wastewater flows through the filter. Aerobic microorganisms in this biological film are then able to degrade organic matter in the wastewater. Since trickling filters only remove organic matter from wastewater, preliminary treatment by screening and grit removal and primary treatment via sedimentation tanks are required before influent reaches the trickling filters. Trickling filters are considered simple, low-cost, and low-power secondary treatment systems. Local effluent standards are met with two low-rate trickling filters, a clarifier with the addition of ferric chloride for phosphorus removal, and a tertiary UV disinfection unit.

The advantages of the TF system include its simplicity and reliability, low power requirements, and low land requirements for the entire treatment train. Disadvantages of this system includes clogging of the TF, predatory snail and vector problems that may reduce treatment efficiency and negatively impact the surrounding environment, and expensive and complicated tertiary treatment to reach effluent standards.

French Vertical Flow Constructed Wetlands

French vertical-flow constructed wetlands (FVCW) are a natural treatment system able to treat raw wastewater (i.e., no pretreatment other than bar screening is required). The FVCW wetland is typically broken up into two stages, but due to the tropical climate/high seasonal temperatures of Horquetas, the wetland can be reduced into one stage. This stage is broken up into two filters, which are dosed with wastewater on opposite schedules. Due to the flow requirements and consequent sizing of the wetland, as well as the specific design and schedule of the doses, the influent dosing system of this wetland requires several individual pumps to properly dose the influent along the filter bed.

The filter bed is made up of gravel and is covered in specific classes of vegetation. The type of vegetation depends on the native species available in the region. A biological film forms on the surface of the wetland that can remove organic matter, while fine-grained gravel in the filter bed removes TSS. The plants that top the filter bed help to prevent clogging, as well as uptake small amounts of phosphorus and nitrogen and provide oxygen to the system. The effluent is collected at the bottom of the filter bed by an underground outflow pipe, after the water has trickled through the entire filter. Pipes for aeration and drainage are also part of the FVCW design.

Advantages of the FVCW are the use of natural processes, minimal daily operation and maintenance requirements, no associated vector or odor problems, and built-in sludge management. Disadvantages of the system include high land requirements, high power requirements and costs associated with the pump design required for the influent dosing system, long start-up times, and parts such as the filter bed media that are difficult to replace.

UASB and Polishing Ponds

The third design alternative includes an up-flow anaerobic sludge blanket (UASB) reactor with polishing ponds. The UASB reactor combines anaerobic and sedimentation technology in a high-rate treatment system. The preliminarily treated wastewater flows into the bottom of the large reinforced concrete UASB basin where it meets an anaerobic sludge "blanket." The influent flow contacts the anaerobic microorganisms, initiating biological reactions that reduce the BOD concentration. The anaerobic process generates biogas, which can be harnessed for energy. As more wastewater enters through the bottom, the water that has already contacted the blanket rises up through the reactor, and BOD is further reduced by the settling of the solids. A trapezoidal phase separator is at the top of the UASB, which separates primary effluent, anaerobic solids, and biogas.

One of the drawbacks to UASBs is that the high-rate treatment does not allow sufficient time for nitrification to occur. In order to meet the required effluent standards, secondary and tertiary treatment are necessary after the UASBs. The project team determined that a series of polishing ponds would provide this necessary treatment. With the high BOD removal efficiency of UASBs, the polishing ponds would primarily remove nitrogen, phosphorus, and fecal coliforms.

Polishing ponds are a series of open-air lagoons in which zones of microbial activity treat various pollutants through biological treatment. Pond systems often consist of a series of anaerobic, facultative, and maturation ponds. Because this alternative uses a UASB to initially treat BOD and COD levels anaerobically, there is no need for an anaerobic pond in the system. Instead, the wastewater can directly enter a facultative pond. Facultative ponds are characterized

Table 2: Influent, required effluent standards, and calculated effluent concentrations.

Concentrations			
Water Quality Parameter	**Influent**	**Effluent Standards**	**Treatment Facility Effluent**
BOD (mg/L)	280	50	45
COD (mg/L)	550	150	84
TSS (mg/L)	220	50	44
TN (mg/L)	50	40	29
TP (mg/L)	20	10	10
Fecal Coliform (MPN/100mL)	5E+07	1000	590

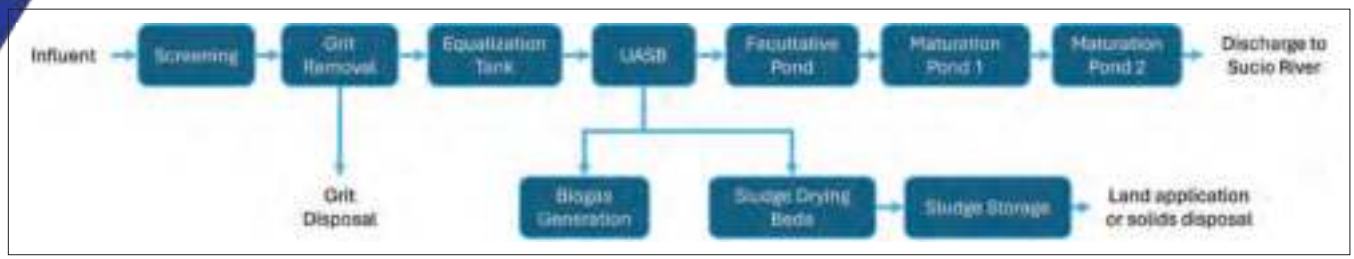

Figure 1: Final treatment train.

by having both an aerobic zone and an anaerobic zone. The aerobic zone is in the top layer of the facultative pond since this region is exposed to oxygen in the air. The anaerobic zone occurs on the bottom layer of the pond where minimal oxygen is present. Together these layers reduce BOD, nitrogen, phosphorus, and fecal coliforms. Maturation ponds are shallower than facultative ponds and only have an aerobic layer. The biological processes of maturation ponds are very similar to those of the aerobic zones in the facultative pond. Maturation ponds are commonly found in series. In this system, the team determined that only two consecutive maturation ponds would be necessary to meet effluent standards. The combination of UASBs and polishing ponds provide many benefits for treatment. The UASB energy generation can offset power consumption, and the only power required to operate the UASB is from pumping in the water. A drawback of UASBs is the sludge production from the treatment. Waste sludge from the UASB needs to be removed regularly, every one to two weeks.

Treatment System Design

The third alternative, UASBs and polishing ponds, was selected for the recommended design. This system most closely matches the priorities of the community due to its minimal O&M, low power requirements, natural pond process, reduced cost, and sustainability potential. A summary of the unit operations are in Figure 1 and a full site plan is included in Figure 2.

Preliminary Treatment

The first stage of the preliminary treatment is bar screens. These screens would be manually cleaned by wastewater operators. The screens of this system were designed to meet Wisconsin DNR standards. According to these guidelines, the bar screens have clear spacing of one to two inches and a slope of 30 to 45 degrees.

A horizontal-velocity grit settling chamber was selected to remove grit from the influent wastewater. The horizontal velocity of the influent was designed to be 1 foot per second. This velocity and the selected chamber dimensions would equate to 100% settling of sand particles with a diameter of 0.2 mm.

UASB Design

The UASB was designed according to *Domestic Wastewater Treatment in Developing Countries* by Duncan Mara. UASB reactor volume is limited to 1000 m^3 and the hydraulic retention time ranges from 6-12 hours, thus multiple reactors are needed in parallel to treat the design flow. To maximize BOD and COD removal while minimizing the number of reactors required, the team selected a retention time of 7.25 hours. A total of six reactors are necessary in the design year, and a seventh reactor is recommended for redundancy. The rectangular footprint of a reactor is 250 m^2 with a depth of 4 meters. The influent pipe system, which runs along the bottom of the tank to allow wastewater to flow upwards, requires an inlet location of 4 inlets/m^2 of surface area. Given a surface area of 250 m^2, 63 outlets along the influent pipe would be required to properly distribute flow.

Polishing Pond Design

The polishing ponds were assumed to be gravity-fed and thus would not need pipes for influent feeding. Greater depths were selected in the design to minimize the footprint of the system and reduce the likelihood of mosquito breeding, a risk associated with shallow ponds. Retention times were chosen in order to adhere to area constraint while still achieving sufficient fecal coliform removal. With a retention time of three days for the secondary facultative pond and a flow of 4.7 MGD, a surface area of approximately 22,200 m^2 was determined with a maximum depth of 2.4 meters to limit mosquito breeding and reduce surface area. With a retention time of two days each for the first and second maturation ponds and the same flow rate, a surface area of approximately 17,600 m^2 for the first maturation pond and a surface area of approximately 17,500 m^2 for the second maturation pond was determined, with each having a depth of 2 m. This gives a total surface area for all three of the polishing ponds of approximately 57,600 m^2.

Solids Handling Design

Solids will be treated in drying beds and stored in a solids storage tank so that biosolids will meet land application

"THE ADVANTAGES OF THE TF SYSTEM INCLUDE ITS SIMPLICITY AND RELIABILITY, LOW POWER REQUIREMENTS, AND LOW LAND REQUIREMENTS FOR THE ENTIRE TREATMENT TRAIN."

requirements. Research indicated that drying beds require a surface area ratio of 0.015 m^2/PE, thus the total area of the drying beds required was determined to be 1235 m^2. Two sludge drying beds were provided per WI DNR standards, which also informed the design of the drying bed media layers. According to *Domestic Wastewater Treatment in Developing Countries*, after drying beds the solids must be stored for an additional three months in a sludge storage tank in order to meet land application requirements in developing countries. The sludge production rate was calculated assuming a production rate of 0.2 kg of sludge/kg of BOD removed, giving a sludge mass of 800 kg/d. Assuming a sludge density of 1400 kg/m^3, this gives a value of 0.57 m^3 of sludge produced per day, or 51.4 m^3 over the course of three months, which will serve as the required sludge storage tank volume.

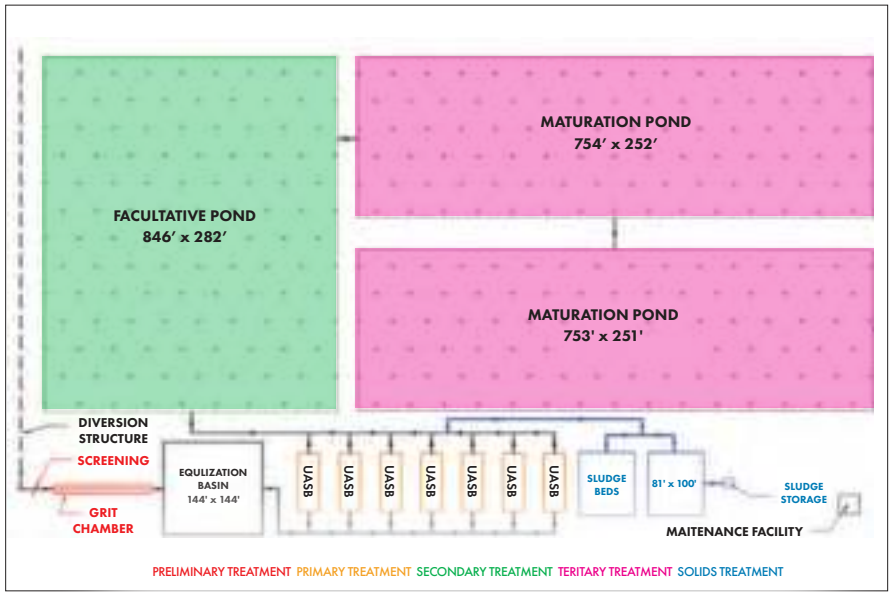

Figure 2: Site plan

Biogas Design

Biogas is generated from the UASBs, but to turn biogas into usable energy, it must first be treated to remove impurities. Biogas production was calculated based on an influent COD concentration of 550 mg/L. Assuming biogas is composed of approximately 60% methane and accounting for temperature and efficiency corrections for a conservative estimate, this gives a biogas production rate of 9400 m^3/d. The resulting energy production was determined to be 60,000 kWh/d, or 21,900 MWh/yr. Biogas upgrading for electricity usage was included as green energy alternative for the community, especially since they are planning to apply for sustainability grants. Should the community choose not to pursue this option, biogas can be flared off out of the phase separators.

Treatment Facility and Outfall Location

The team was provided with three options for locations of the treatment facility. All locations were located to the northeast of the community, and ranged in area from approximately 86000 m^2 up to just over 98000 m^2 (approximately 21-25 ac). The selected site was the largest of the three, due to the design of the treatment facility having a high land requirement. The outfall was chosen to be the Sucio River, the main river in the region near Horquetas. While there were options to outfall closer to the treatment site, the team determined that outfalling into a larger body of water would be better for equalizing volume of flow.

Collection System

The design of the collection system was limited to basic routing of piping, as well as estimated placement of pumping stations, due to the 75 miles of pipes combined with a lack of topographic information limiting potential design. The collection system was broken down into seven districts, as shown in Figure 3. These districts were generally informed by topography, and the estimated population distribution. The system is primarily gravity-fed, however, a significant portion of the network lies below the elevation of the treatment site, and thus, approximately 35 lift stations will be required across the network. Lift stations will require a case-by-case analysis to determine the minimum volumetric flow rate required per station. Furthermore, inverted siphons were also considered and deemed an appropriate addition to the system, as there are a high number of shallow stream crossings in the network. The flows will all enter into District 6, where the treatment site is located. The design of the network will follow standards set forth by NR110.13(3)(f) from the Wisconsin DNR. These standards include items such as maximum and minimum slopes and velocities, as well as pipe sizing, and distance between manholes. The material selected for the system is SDR 35 PVC pipe. This option was selected due to its frequent use in wastewater situations, combined with affordability, accessibility, and resistance to corrosion from both inside and outside. Additionally, as the pipes are

"THE TOTAL FLOWRATE WAS CALCULATED FROM THREE SOURCES: DOMESTIC FLOW, COMMERCIAL FLOW, AND INFILTRATION. DOMESTIC FLOW WAS INFORMED BY THE POPULATION ESTIMATE FOR THE DESIGN YEAR."

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Figure 3: Map of the collection districts, three treatment site alternatives (pink polygons) and the outfall location (white star).

gasketed, installation will be easier than other pipe materials that require a more complicated connection method.

Cost Analysis

For the capital cost estimations of the treatment alternatives, the components of the treatment trains were broken down and separated into different working spaces and later compiled into a cost summary with line-item names, units, unit costs, quantities, and total amounts both in US Dollars and Costa Rican Colones. Most of the structures in the system were constructed with reinforced concrete that involved some excavation for those that were required to be below grade. The O&M costs for the treatment alternatives were broken down to line items including: labor, chemicals (if applicable), lab testing annually at a quarterly rate, electrical rates (varying in cost due to the differences within the treatment alternative), part replacements within the treatment alternatives, and maintenance of a biogas upgrading unit (only in the UASB and Polishing Ponds alternative). Figure 4 shows the breakdown of the costs by category.

Construction Schedule

The team created a schedule in Primavera P6 for the selected design. The dry season in Costa Rica begins in December, and excavation would be the first step in the construction process. This would minimize pumping of water due to higher water levels below the surface. While the collection system is under construction, the construction of the treatment facility would begin. The total duration of the project was estimated conservatively to be 153 days with five working days in the week and holidays, or just over seven months. CS

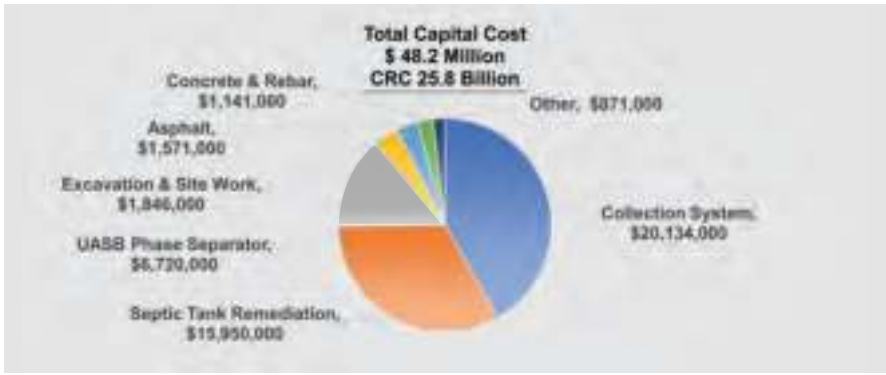

Figure 4: Construction cost estimate pie chart.

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GLOBAL WATER STEWARDSHIP

GWS Update

AguaFEST TICOSAN 97th ANNUAL MEETING Recap MIDWEST DESIGN COMPETITION

By Sarah Guzman and Joe Lapastora

SUMMER 2024

Global Water Stewardship (GWS) has been hard at work in spring of 2024. Here is a quick recap of the three events that have kept volunteers busy over the past few months.

AGUAFEST

The second annual AguaFest was held on Thursday, April 25 in the community of La Fortuna, Costa Rica and it was the biggest AguaFest yet! For those who are not familiar with the event, AguaFest is an all-day fair for students between 3rd grade and 7th grade, where GWS partners with the Asada of La Fortuna to provide a variety of educational activities for the students. This year, 285 students attended the event and there were over 10 different educational activities, which were led by GWS volunteers and the Asada personnel.

Brandon Friedland, the current GWS Public Education and Outreach Chair, was the organizer and lead for AguaFest. Brandon spearheaded this initiative in 2023 and the results and impact have been phenomenal. We will look to bring AguaFest to other communities in future years with the goal of rotating to a different community every year, in addition to also hosting the event in La Fortuna.

MSDC

The 5th Annual Midwest Student Design Competition (MSDC) was held on April 8 at the Monona Terrace in Madison, WI. One of the three categories that is offered at the MSDC is the Global Water Stewardship (GWS) Category, which tasks collegiate design teams to design a centralized wastewater treatment facility and

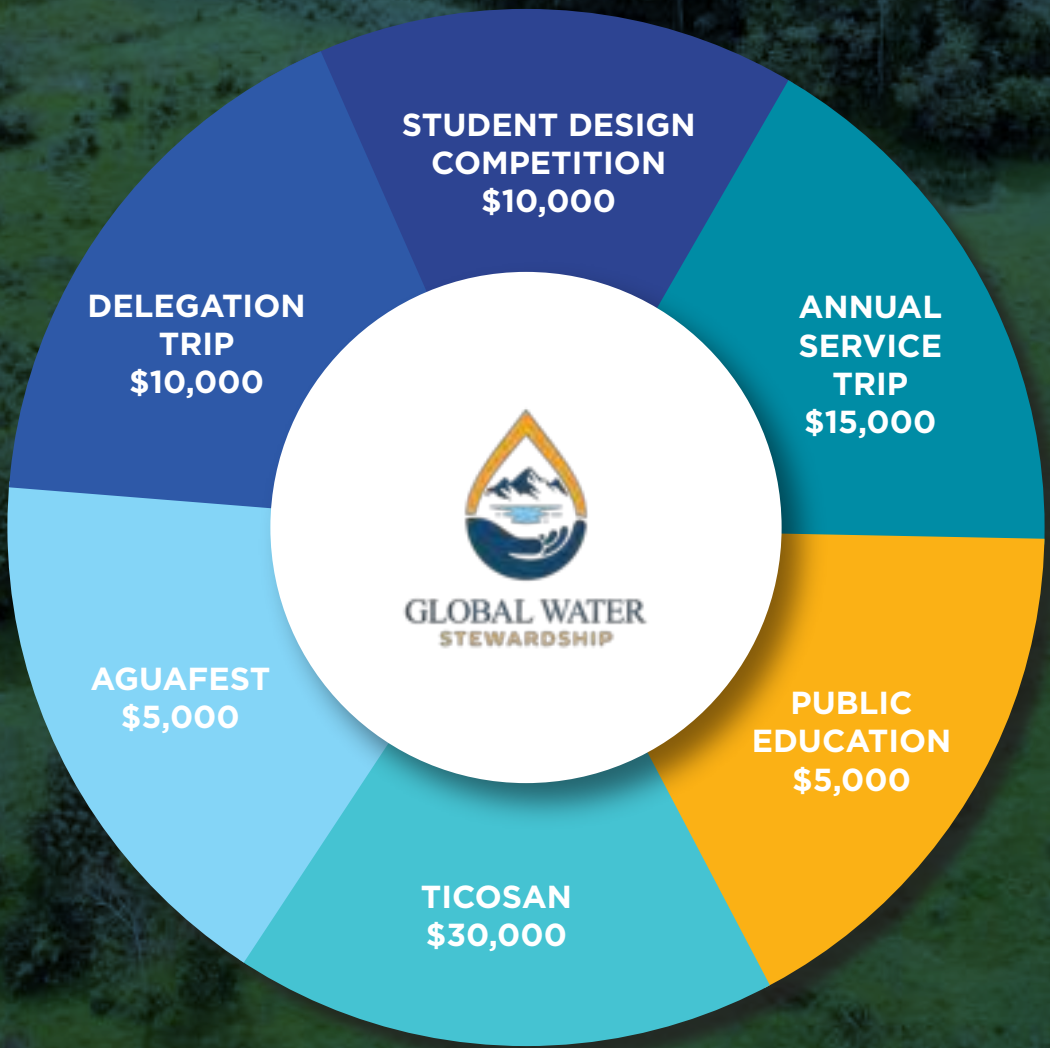
accompanying collection system for a Costa Rica community. A total of six University teams competed in the GWS category in person, in addition to four University teams who competed in the GWS category Internationally. The design team from Marquette University took home 1st place (with this being the third straight year a team from Marquette University taking the top prize) and will accompany GWS professionals to Costa Rica on our upcoming Service Trip in August. The team consisted of Ben Craighead, Veronica Bevan, Joe Camarda, Maya Adelgren, and Ashley Tan.

SILENT AUCTION

The CSWEA 93rd Annual Meeting was held on May 13-15 in Schaumburg, IL. As is typical at the annual meeting, GWS held a silent auction to raise funds for our organization. As is also always typical, CSWEA members showcased an incredible amount of support. This year, we were able to raise $2,400 for our organization! A huge shoutout to all those who donated items for the auction, for those who submitted bids, and to Rich Hussey for his efforts as the Silent Auction Chair on the LAC. CS

GWS CALL FOR SPONSORS

PROJECT OVERVIEW



OUR MISSION

Global Water Stewardship resolves sanitation issues in developing countries. Our focus is on educating the public and engineering sustainable centralized solutions to keep waterways clean and communities healthy.

COMPLETED PROJECTS

COMMUNITY DESIGNS

- Sámara
- Monteverde
- La Fortuna
- Dominical
- Bahía Ballena
- Palmar Sur
- Piedras Blancas
- Montezuma
- Bijagua de Upala
- Horquetas

BIOGARDENS

- Cloud Forest School (Monteverde)
- Escuela Zeta Trece (La Fortuna)
- Escuela Verde (Bahía Ballena)
- Escuela de Montezuma
- Escuela San Fernando
- Escala de El Jardin

TECHNICAL SUPPORT

- Ptar Los Tajos (San José)
- Parque Manuel Antonio (Quepos)
- Ptar San Isidro (Pérez Zeledón)

WASH EDUCATION PROGRAM

- Cloud Forest School (Monteverde)
- Escuela Zeta Trece (La Fortuna)
- Escuela Verde PK (Bahía Ballena)
- Escuela Flor de Bahía (Bahía Ballena)
- Colegio Humbolt (San José)
- Liceo La Uvita
- Escuela Verde
- Uvita Christian Academy
- Escuela Dominical
- Escuela de Montezuma
- Escuela San Fernando

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SPONSORSHIP PACKAGES

GWS wants to provide your company with a year-round presence and direct outreach to our members and community. Our sponsorship packages are tailored to provide you with year-long exposure and customizable options, allowing you to select the best add-ons to meet your organization's goals. An annual sponsorship package gives your company recognition at our international conference and within our communications and helps us budget effectively for a year's worth of programming.

The GWS Sponsorship package offers different tiers, and you can choose the one that fits your company's goals the best. All the sponsorship packages are based on a 365-day period.

SPONSORSHIP PACKAGES

EXPLANATION OF BENEFITS

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GWS Website Recognition
Your name and logo acknowledgment on the GWS website.

Official AguaFest Sponsor
Recognition on the GWS AguaFest website, your name and logo in all of the AguaFest social media advertisements, your logo on the event t-shirts, and your logo on the physical banners the day of the event.

Official Service Trip Sponsor
One complimentary Ticosan registration, recognition on the GWS Service Trip website, your name and logo in all of the service trip social media advertisements, your logo on the trip t-shirts, and your logo on the GWS quarterly newsletters.

Official WEFTEC Sponsor
Your company's name and logo acknowledgment on GWS social media pages, and recognition on GWS's WEFTEC flyers.

Official Ticosan Sponsor
Two complimentary Ticosan registrations, recognition and logo at the Ticosan Networking Reception, standalone promotional slide at the event, recognition on the GWS Ticosan website, your name and logo in all of the Ticosan social media advertisements, your logo on the Ticosan t-shirts, half price exhibitor package, and your logo on the GWS quarterly newsletters.




RENEWABLE ENERGY
IN THE GREAT LAKES AND BEYOND

City of St. Cloud Nutrient, Energy, and Water Resource Facility Energy and Equipment Improvements / St. Cloud, MN

Paving the Way Through Innovation

Carollo's Midwest team is currently assisting the City of St. Cloud, MN, with evaluating implementation of renewable natural gas (RNG) and developing the nation's first hydrogen production system at a water resource recovery facility. For this project, Carollo helped the City receive a $3.7-million grant from the Department of Energy. These facilities will generate revenue for the City, while setting a new industry benchmark for sustainability.

Furthermore, our team has implemented projects across the country to beneficially reuse biogas from the solids digestion process by injecting RNG directly into natural gas pipelines for downstream use. Our RNG projects at South Platte Renew and the City of Longmont in Colorado received the prestigious 2020 and 2021 WEF Project Excellence Awards, respectively.

South Platte Renew Pipeline Injection Project / Englewood, CO

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SIWI STOCKHOLM JUNIOR WATER PRIZE

The Stockholm Junior Water Prize (SJWP) is the world's most prestigious youth award for a water-related science project. The prize taps into the unlimited potential of today's high school students as they seek to address current and future water challenges.

WISCONSIN'S 2024 STOCKHOLM JUNIOR WATER PRIZE (SJWP) WINNER

On June 20-23, 2024, Tyler travelled to the Colorado School of Mines in Golden, CO, for the 2024 SJWP national competition. Congratulations Tyler, and thanks for making Wisconsin proud.

Tyler Clair

Grade 12

Minnetonka High School

Minnetonka, MN

TITLE

Food Waste-Based Biocoagulants: A Novel Approach to Sustainably Remove Polystyrene Microplastics for Future Alternatives in Water Treatment.

ABSTRACT

The average American drinks over 39,000 microplastics annually. New studies on human cells suggest microplastics are potential neurotoxins and carcinogens. The purpose of this study is to determine a new, sustainable method utilizing food waste-based biocoagulants to remove microplastics in water treatment. 15 biocoagulants made of aloe, apple, avocado, banana, celery, coffee, corn, cucumber, lemon, mango, okra, pepper, potato, tea, and tomato were assessed. Triplicate jar tests were performed to simulate a water treatment basin. Average microplastic removal rates were calculated, and t-tests performed with nine biocoagulants having no statistical difference in microplastic removal rates compared to alum, the control, proving each to be viable alternatives. A second and third round of experiments varying pH and biocoagulant blends resulted in the Banana-Pepper blend removing 98.2% of microplastics at a pH of 8, which is statistically greater than alum. Three other blends removed statistically greater amounts of microplastics when compared to alum at a pH of 8. Instead of food waste ending up in landfills and emitting greenhouse gasses, it can be reused to sustainably remove microplastics in water treatment.

BIOGRAPHY

Hi, my name is Tyler Clair, and I am a rising senior at Minnetonka High School, MN. I am extremely passionate about utilizing what I have learned in chemistry, physics, and math to solve environmental issues. One of the fields I am most interested in right now is environmental water chemistry. In the future, I would like to continue my interest by studying either environmental engineering or chemical engineering in college. The latest news on the presence of microplastics in our drinking water, along with keeping up with the most current research on microplastics inspired me to focus on developing a new solution to sustainably remove these harmful contaminants during the water treatment process. My long-term goal is to determine a way to prevent microplastic contamination in our water once and for all.

Outside of research, I am highly involved in my school's DECA (Distributive Education Clubs of America) and HOSA (Health Occupations Students of America) chapters, National Honor Society, and Student Government. I also value giving back to my local community by volunteering over 100+ hours annually and am currently paying it forward as a First Mate mentor for incoming high school freshmen. Additionally, I work two part-time jobs, one as an Undergraduate Research Assistant at the Arnold research group focusing on water chemistry at the University of Minnesota, Twin Cities, and the other as an Advanced Placement (AP) STEM tutor. In my free time, I enjoy reading and going on runs. I also really enjoy attempting to recreate my favorite ethnic dishes in my kitchen! I am a Postsecondary Enrollment Options (PSEO) student at the University of Minnesota, Twin Cities, and have had the opportunity to take some very interesting and challenging courses in organic and physical chemistry. Next year, I am excited to take an environmental engineering course focused on applying my passion for chemistry to environmental systems and issues. I am grateful for the opportunity to share my project and represent Minnesota at the US Stockholm Junior Water Prize competition in June. CS

2024 WATER'S WORTH IT ESSAY CONTEST WINNERS

RESEARCH CATEGORY

1st Place (IL)

Zayan Ali, Naperville IL

Zayan is 14 years old and enjoys reading, video games, stop motion videos, tennis, and skiing. His favorite class in school is science (physics). Zayan's favorite ways to enjoy water include drinking it, swimming, and fishing!

ZAYAN'S ESSAY

Restoring the DuPage River

My dad and I go fishing every summer in our local ponds and lakes whenever we can. It provides the time to chat and reflect on our lives while enjoying nature, away from the constant noise of society. We usually catch small fish – mostly bluegills – and even if we do catch one big enough to take home, there is an unspoken rule that you shouldn't eat it. That's because the water is polluted, and the fish carry some of those chemicals. This has always upset me because I can't enjoy the fruits of my labor. However, I never took the time to find out why it is like this. Now that I have researched my local waterways, I have learned why and what the problems are of these bodies of water.

One of my local waterways that is struggling is the DuPage River. The river is 28.3 miles long and is a tributary of the Des Plains River. It is comprised of two branches, the east and the west branch. Multiple streams and creeks also feed into it, including one that runs through my own neighborhood in Naperville, IL. On the How's My Waterway website, I learned that the river's health is good in aesthetic quality but is impaired in aquatic life and fish consumption. In other words, the animals living in the water are struggling, and the unspoken rule just got spoken: The website also says that the fish are not good to eat due to high levels of chemicals

There are multiple ways these chemicals reach the river. This includes the dumping of chemicals in storm drains, runoff from lawns and farms that use pesticides and herbicides, as well as industrial waste. Additionally, the amount of garbage in the river has built up to the point where it is extremely toxic to the fish.

I was grateful to learn that there is a five-year restoration plan for the DuPage River in progress, led by the US Army Corps of Engineers and the Morton Arboretum, an Illinois-based botanical garden and research center. Engineers measure the amount of pollutants in the river each day and compare it to the standard for that particular pollutant set by the Environmental Protection Agency (EPA). The chemicals they are trying to control are usually ones that the river needs, but are getting out of hand. For instance, the element nitrogen is needed in rivers to produce food for organisms living in the water, but as the saying goes, "too much of a good thing can be a bad thing." If the amount of nitrogen exceeds certain levels, animals can suffocate, and species can start dying off. Engineers are also preventing erosion that hinders animal and habitat quality by shaping the river banks into a more natural formation. The animals in the river matter because without them the ecosystem would fail.

As bad as things are though, we shouldn't lose hope. For example, when my family and I visited Switzerland for vacation in 2018, we were extremely impressed by how clean and clear their waterways were. The water still has trace substances, but the regulations are extremely strict. This wasn't always the case though. Until the 1950s, sewage was dumped directly into the rivers and lakes across Switzerland. The government made water treatment a law after a deadly disease outbreak from contaminated water. Over the years they have connected most of the population to a sewage system and built 800 waste treatment plants. They continue to improve the way they manage their waterways and are now focusing on mitigating the negative impact of pesticides and other chemicals on plants and animals.

I believe that the restoration plan underway here for the DuPage River can get us to the proper level of cleanliness as well. All residents in the area can also positively impact the river's health. One step that

we can take to prevent more pollution in the river is to not dump any chemicals in storm drains. There are also "DuPage River Sweeps" where residents can volunteer to help clean up the river. Over the past 30+ years that this event has occurred, more than 9,000 volunteers have removed nearly 300 tons of garbage from DuPage County streams, according to The Conservation Foundation.

It is clear that the DuPage River needs help. The current efforts underway are already making a difference as the river's aesthetic quality is good. This is a step in the right direction, and by working together we can fully restore our river's health. Maybe someday my dad and I will even be able to eat the fish that we catch in the river.

RESEARCH CATEGORY

1st Place (WI)

Akshaya Addanki Tirumala, Elm Grove, WI

Akshaya Addanki Tirumala is a rising 7th grader and takes her education at the Elmbrook School District middle school, Pilgrim Park. She has one brother and has many wonderful hobbies. She isn't afraid to fail and always loves to try new things. Winning in this competition is an inspiration and motivation for her to write more. She is part of the Junior Spartans girls basketball team, and participates in cultural dance, robotics, and swimming. She is also passionate about math and science. The reason that she wrote this piece is because she has always really loved writing and she wanted to show her talent in this competition. She also does FLL robotics, this season's topic is going to be water related; therefore, she wanted to think more about water conservation. When she does something she will always put all of her hard work and effort. Akshaya has got her support and guidance from her teachers, Mrs. Murty, Mrs. Ledin, Mrs. Andersen, and Mr. Carini. She has also gotten support from her parents, Sireesha and Anand.

AKSHAYA'S ESSAY

2.1 BILLION PEOPLE Globally Lack Safe Water at Home

This research paper aims to provide a comprehensive analysis of the Wisconsin River watershed, exploring its geological characteristics, hydrology, ecological significance, human impacts, and management strategies. By examining various aspects of this watershed, we seek to enhance understanding and promote sustainable management practices for its long-term preservation.

There are many watersheds in Wisconsin, the reason that I have chosen this one is because it really stands out from the variety of problems it comes with and it shows that we must work together and fix our watershed.

Introduction

The Wisconsin River watershed, spanning over 12,000 square miles, is one of the largest watersheds in the state, comprising a complex network of rivers, lakes, wetlands, and forests. Its significance extends beyond its natural beauty, as it supports diverse ecosystems, provides drinking water, facilitates transportation, and sustains recreational activities and industries. However, this watershed faces various challenges, including pollution, habitat loss, and altered hydrological patterns due to human activities. Understanding the dynamics of the Wisconsin River watershed is crucial for effective conservation and management efforts.

Geological Characteristics

The geological features of the Wisconsin River watershed significantly influence its hydrology and landscape. The region primarily consists of sedimentary rocks, glacial deposits, and ancient bedrock formations. The Wisconsin Ice Age, which occurred around 10,000 years ago, sculpted much of the watershed's current topography, leaving behind moraines, drumlins, and outwash plains. Understanding the geological history provides insights into the distribution of soils, groundwater flow, and erosion processes within the watershed.

Hydrology

The hydrological cycle plays a fundamental role in shaping the Wisconsin River watershed. Precipitation, snowmelt, and groundwater contribute to the flow of water through streams, rivers, and lakes. The Wisconsin River, originating from the confluence of the North and South Forks near Lac Vieux Desert, serves as the main artery of the watershed, flowing southwest for over 400 miles before joining the Mississippi River. The hydrology of the watershed is influenced by climate variability, land use practices, and water management infrastructure, with implications for flooding, water quality, and aquatic habitats.

Ecological Significance

The Wisconsin River watershed supports a rich diversity of plant and animal species, including rare and endangered ones. Riparian forests, wetlands, and prairie remnants provide crucial habitats for wildlife and contribute to ecosystem resilience. Key species such as sturgeon, muskellunge, and migratory birds depend on the watershed for breeding, foraging, and migration. In addition, the watershed's ecological services, such as nutrient cycling, flood regulation, and carbon sequestration, are extremely useful for maintaining environmental health and human well-being.

Human Impacts

Human activities have significantly altered the Wisconsin River watershed, posing threats to its ecological integrity and water quality. Urbanization, agriculture, industrial discharge, and dam construction have led to habitat fragmentation, sedimentation, nutrient pollution, and invasive species introduction. These impacts degrade water resources, diminish biodiversity, and undermine the resilience of aquatic ecosystems. Addressing these challenges requires collaborative efforts among stakeholders, including government agencies, non-profit organizations, and local communities.

Management Strategies

Efforts to conserve and restore the Wisconsin River watershed are underway, guided by integrated management approaches that balance ecological, economic, and social objectives. Watershed-based planning, land conservation initiatives, riparian buffer establishment, and water quality monitoring programs are among the strategies employed to mitigate pollution and habitat degradation.

Human Implications

The Wisconsin River watershed profoundly influences human communities in various ways, shaping livelihoods, recreation, and quality of life. As a vital source of freshwater, the watershed supports agriculture, industry, and municipal water supply systems, sustaining economic activities and human well-being. Additionally, the scenic beauty and recreational opportunities offered by the watershed, including fishing, boating, and hiking, contribute to tourism revenue and cultural identity for local residents. However, human activities such as urbanization, agricultural runoff, and industrial pollution can degrade water quality, posing risks to public health and ecosystem services. Therefore, understanding the interdependence between human actions and the health of the Wisconsin River watershed is essential for promoting sustainable development and ensuring the continued provision of ecosystem benefits for future generations.

Reflection on Learning

Through the exploration of the Wisconsin River watershed, we have gained valuable insights into the intricate relationships between geology, hydrology, ecology, and human interactions within this dynamic ecosystem. We have learned about the geological forces that shaped the landscape, the hydrological processes that govern water flow, and the ecological significance of diverse habitats and species. Furthermore, we have examined the profound impacts of human activities on the watershed highlighting the importance of responsible stewardship and conservation efforts. By understanding the complexities of the Wisconsin River watershed, we are better equipped to address current challenges and work towards sustainable management practices that balance environmental protection with human needs and aspirations.

Conclusion

In conclusion, the Wisconsin River watershed is a complex and dynamic system that holds immense ecological, economic, and cultural value for the state of Wisconsin. By understanding its geological, hydrological, and ecological characteristics, as well as the impacts of human activities, we can develop effective management strategies to safeguard its health and resilience for future generations. Continued research, monitoring, and collaboration are essential for promoting sustainable water management practices and ensuring the long-term viability of this vital resource.

RESEARCH CATEGORY

2nd Place (IL)

Aksel Escareno, Wheaton IL

Aksel is 13 years old and enjoys soccer, running, drums, and drawing. His favorite subject in school is math. Aksel loves how refreshing water is, whether it is a good shower or a day of kayaking.

AKSEL'S ESSAY

One Drop Makes a Difference

In our world, individual actions impact people and communities near and far. Both a drop of water from a sink and a raindrop from a cloud travel through watersheds to join rivers on their way to the ocean. The health or impairments of these drops have a combined impact along their journey. My watershed, Lower West Branch DuPage River (LWBDR), in Wheaton, IL, is made up of 853 acres of land. The water from this portion of land flows into the Springbrook Tributary or Ferry Creek and enters the Lower West Branch DuPage River, where the water joins the DuPage River on its way to the Mississippi River.

Though my community appreciates water, surprisingly, 90% of the waters in the LWBDR watershed are impaired. The streams, rivers, and lakes lack oxygen, contain water pollutants (such as nitrogen, phosphorus, bacteria, and fecal coliform) and have a degraded habitat. These impairments endanger aquatic life and impact people's ability to boat and swim. Because of these impairments, the local government, together with the Environmental Protection Agency, has taken action to add more dissolved oxygen to help aquatic life thrive and to decrease the minimum maximum load of pollution allowed to enter the water. On one of my daily runs, I noticed the Spring Brook Wetland and Creek Restoration Project at the Blackwell Forest Preserve. This project directly improved the aforementioned impairments. For instance, the project created wetlands to convey upstream stormwater and treated effluent and also removed a dam to allow fish to swim freely upstream. This project, funded by the Illinois Tollway, was largely completed in 2020 to mitigate impacts from rebuilding the Central TriState Tollway (Blackwell).

After researching the restoration project at Blackwell Forest Preserve, I wondered where local effluent was treated. As a result of this investigation, I took a virtual tour of the Wheaton Sanitary District (WSD), a reclamation plant that treats wastewater from Wheaton, Southern Carrol Stream, a small portion of Glen Elen, and unincorporated parts of DuPage County (Virtual Plant Tour). To improve the treatment of effluent, Congressmen Sean Casten obtained 2.6 million dollars to invest in WSD.

Matthew Larson, Executive Director of WSD, states that the money will provide "wastewater treatment infrastructure that will be used to keep our streams, rivers, and waterways clean" (Casten Announces EPA Approval). This funding will ensure that the water released from WSD into Spring Brook is healthy for the environment.

While WSD does their part to clean the watershed, I can do mine. Like a drop of water becoming part of a stream, my individual actions, joined by the people around me, can improve the condition of our watershed. As a result of this essay and research, I am convinced to help change impaired waters. For instance, I will shorten my showers, pick up my dog's waste and not put too much salt on the ice after I shovel, seeing that these things all contribute to the low oxygen level. As Mother Teresa said, "I alone cannot change the world, but I can cast a stone across the waters to create many ripples."

Writing this paper made me think of the little harmful things I put in the water while thinking that they won't hurt anything. However, thousands of people are doing the same exact thing at the same exact moment. This negatively affects miles of ocean, river, and creek water. In contrast, I recognized how individual organizations such as the Wheaton Sanitary District, the local government, the federal government, the Illinois Tollway, and the Park Districts unite to care and conserve our watershed. Teamwork is at the heart of great achievements.

RESEARCH CATEGORY

2nd Place (WI)

Vedh Bagare, Brookfield, WI

My name is Vedh Bagare and I am currently 13 years old. I live in Brookfield, Wisconsin and will attend Brookfield East High School as a freshman for the 2024-2025 school year. Throughout my childhood, I lived in seven different states, with most of them being on the East Coast. I enjoy writing and love to read books. Besides writing, I am a competitive chess player, boy scout, and am almost a black belt in Taekwondo. In school, I participate in various activities like NJHS, science olympiad, forensics, and math club. In my free time, I play video games with my friends, and garden. My favorite class is science and I particularly like engineering real-world solutions for problems in our everyday lives. Additionally, I like to volunteer at Power of Pawns, and NJHS. I hope to continue learning throughout high school and beyond.

Vedh's Essay

Picture a vast web connecting lakes, rivers, ponds, glaciers, and more. A network that covers the entire US and shapes the very landscape that we live on. This is none other than a watershed. A watershed is an area of land where all flowing surface water converges to a single body of water such as a river or lake. Watersheds are crucial to humans and the environment as they provide clean drinking water, support habitats, slow down floods, and minimize erosion. Additionally, watersheds are used for agricultural and recreational purposes. The continental US is covered by 78 main watersheds which are made up of smaller watersheds. The Underwood Creek Watershed is a watershed that covers 12,533 acres of Southeastern Wisconsin and consists of 18 water bodies. Like many other watersheds in Wisconsin, the Underwood Creek Watershed is in bad health. According to the US Environmental Protection Agency, 4 of the 18 water bodies are impaired while the condition of the other water bodies is unknown. One of the named water bodies with impaired health is Underwood Creek.

Underwood Creek is a 5.7-mile river located in Waukesha County. The river is impaired in the areas of Recreation and Fish and Aquatic Life. Firstly, this river is not good for fish and other aquatic life due to the amount of chloride in it. Chloride is a mineral found in table salt, and can be toxic to fish and other aquatic life. Another reason why Underwood Creek is unsuitable for aquatic life is due to the levels of phosphorus it contains. Phosphorus is found in foods such as chicken, eggs, and milk. While phosphorus is an essential element of plant growth, too much of it can be deadly for aquatic life. Increased phosphorus leads to extra algae growth which reduces the amount of oxygen in the water, endangering the lives of fish. Secondly, Underwood Creek is also not fit for recreational use. This is because water in the river contains Fecal Coliform bacteria. When consumed, this bacterium can cause stomach-aches and other gastrointestinal diseases. Moreover, presence of Fecal Coliform in water might mean signs of pathogens (disease causing organisms). These contaminants are mainly caused due to human activity. Highway, bridge, and road runoff are confirmed causes of chloride making its way into Underwood Creek. In addition, non-point sources have led to increased levels of phosphorus. All these things have led to Underwood Creek declining in health.

Unfortunately, a similar situation is plaguing Dousman Ditch, another river in the Underwood Creek Watershed. The declining conditions of these water bodies negatively affects wildlife and society. Aquatic life forms such as fish play crucial roles in maintaining the health and balance of river ecosystems. They contribute to nutrient cycling, water purification, and habitat creation. A decline in aquatic life can also disrupt the wildlife. For example, a decrease in fish populations can affect animals that depend on them for food. Water bodies also provide animals like deer, rabbits, and squirrels water to drink. If the water is contaminated, the animals will become unhealthy, which can throw off the whole food chain. This can affect society as activities such as fishing and hunting would become unavailable.

To counter these effects of impaired water bodies, multiple conservation efforts have taken place. One example of this was the restoration plan; Milwaukee River Basin TMDL. Total Maximum Daily Load (TMDL) is the calculation of the maximum amount of a pollutant allowed to enter a waterbody so that the waterbody will meet and

continue to meet water quality standards for that particular pollutant. This project reduced the amount of Fecal Coliform and Phosphorus in several rivers in the Milwaukee area, including Underwood Creek. Another project that improved Underwood Creek was the Underwood Creek Great Lakes Fishery and Ecosystem Restoration project. This project improved Underwood Creek by removing concrete and drop structures while adding a limestone bottom. These changes would allow for fish passage and wetland access. These projects have significantly improved the condition of water bodies in the Underwood Creek Watershed. This affects me personally as I like being near water bodies. Being in Boy Scouts, I have hiked and camped near water bodies and I believe that they should be conserved and protected. I help protect my watershed by conserving water, using fertilizer in my garden correctly, and telling my friends to do the same.

In conclusion, I learned a lot about my watershed and the importance it plays in all our lives. I learned more about particular water bodies near my community, their condition and ways they are being restored. I look forward to going to these water bodies, and possibly participating in restoration activities in the future.

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CREATIVE WRITING CATEGORY

1st Place (IL)

Bridget Gaffey, Chicago IL

Bridget is 12 years old and enjoys playing softball, painting, and reading. Her favorite subjects in school are math and social studies. Bridget loves water, not only because it is good to drink, but because it sustains life.

BRIDGET'S ESSAY

Katie's Big Day

Katie was a 12-year-old girl who loved painting, animals, and especially softball. Her team made it to the championship for their league! It was in five days. The best part was that the championship was at their home field. Her field, Gompers Park, was right next to their watershed, the Middle North Branch Chicago River. She was learning about the watershed in school, but never paid much attention.

One day, her teacher, Mr. Connelly, said, "Since we have been learning about the watershed near us, we will be doing a presentation on it in five days. You will have plenty of class time to work, but I recommend that you do some research at home." Katie was suddenly paying attention.

"It's due in five days?!" she asked.

"Yes, but if you were paying attention in class, this will be no problem for you."

Katie gulped. "I'm never getting this done. It's so boring too!"

After school that day, Katie was on the softball field when she looked to her right. "This must be the watershed Mr. Connelly was talking about." Just then, her softball teammate, Bridget, came over to practice together.

As they practiced, they talked about their science assignment. "Have you started the project yet?" Katie asked.

"No, it's so boring. I don't know why we even have to do it."

"Exactly! That's what I've been thinking the whole time."

Just then, Katie hit the ball farther than she had ever hit it before. "Woah!" Bridget exclaimed, "I think that went in the river!"

"I didn't know I could hit it that far!"

"I don't have another ball."

"Don't worry, I'll get it." Katie replied. As Katie arrived at the river's edge, she could barely see the bright yellow softball through the murky water. "Wow," she thought, "maybe when I get home, I could do a *little* research on the waterway."

As soon as she got home, she sat down at her computer and researched her local waterway. "I love animals, so maybe I should start with that," she thought. She learned about the aquatic life in her waterway, as well as the animals that live in the area. "Oh no!" she thought. "So many things are harming these animals and no one is doing anything about it. I guess this isn't as boring as I thought it would be."

With only four days until both the championship and the project due date, Katie divided her time between researching her watershed and practicing softball. In science class, she found that the things harming the North Branch Chicago River are: abnormal flow, bacteria and other microbes, mercury, nitrogen and/or phosphorus, PCBs (man-made chemicals), and pesticides. Working on her final project, she thought, "This is going to be great!"

After finishing her project, for the next few days she worked on her softball skills until finally, the big day arrived. Katie is so excited that she can hardly wait for class. As she walked in, Mr. Connelly asked,

"Who would like to present first?" Katie's hand shot into the air. Feeling nervous at first, she shook off the feeling when she thought about all of the hard work she put into this. She began speaking.

"Inside the universe, there is our world. Inside our world, there is our country. Inside our country, there is our watershed, the Middle North Branch Chicago River. And inside that, is our waterway, the North Branch Chicago River. Our waterway is impacted by many things, most of them are not good for the environment."

She looked at her classmates. They were hooked. She continued: "In fact, the overall health of our watershed is impaired! There are so many things harming the water including abnormal flow, bacteria and other microbes, mercury, nitrogen and/or phosphorus, PCBs (man-made chemicals), and pesticides. Animals that have to live in this contaminated water include freshwater sponges, clams, mussels, and dozens of species of fish. There are also many other animals that live near the water and have to drink it. These include herons, red foxes, beavers, and minks. Even though this water is contaminated, there are ways to reverse it. But it also goes a long way if we take better care of our environment."

"That was amazing, Katie," said Mr. Connelly. "Who's next?"

After school that day, Katie's team battled through their championship game. Katie was the last batter, and they were down two runs. The bases were loaded when Katie stepped up to the plate. She pictured hitting the ball into the river just like last time. The pitcher pitched the ball into Katie's sweet spot. She smashed the ball into the river, and ran the bases. Her team won! As they celebrated, Katie thought about how far she has come in the last few days.

CREATIVE WRITING CATEGORY

1st Place (WI)

Abigail Rohrbeck, Beloit, WI

Abigail is an 8th grader at Fruzen Middle School. She loves to sing, dance, and act. She's been playing violin since 5th grade and has been writing since she could pick up a pen. In her free time, Abigail likes to do baton competition team events, crochet, and read. Abigail is very grateful for everyone who has helped her along the way and she is very excited to be a published author.

ABIGAIL'S ESSAY

Hitting "Rock" Bottom

I woke up with a grin. Today there was no school! And tomorrow there would be no school, all the way until next week! I was so excited.

"Good morning." Said my mom as she sat down at the table with a cup of coffee in her hand.

"Good morning Mom!" I chirped back at her with a grin. "Can I go to the river today?"

"Yes, as soon as you eat your breakfast." Mom chided. I shoveled food in my mouth until she was satisfied. Then, I changed into a t-shirt and leggings and went outside. We lived very close to the Rock River. And my friends and I loved playing in it. Or just hanging out by it.

"Hey Amy!" said my friend Kathy as we walked towards the woods where our river lived. We just called it a river, even if it wasn't one. "Are you ready for sleeping in, and staying up late?"

I nodded my head. "Oh yeah. I can't wait!!!!" I replied back. "This is going to be so much fun!"

Kathy and I entered the woods.

I felt a hush fall over us. Being in the woods always does that to me. I'm not sure why, it's just so peaceful. I heard birds chirping and the soft sounds of animals breaking leaves and sticks. We are quiet. I heard frogs croaking, and I know we're close.

"Are Frog and Liv coming?" I whispered to Kathy. She nodded. We kept walking in silence until the ground started to become more muddy and dense. Then we stopped.

"Where are they?" Kathy said, looking around us. And by they, I think she means Frog and Liv.

"Are they meeting you here?" I asked, looking around as well. "I don't see anyone. Maybe they're still walking or something?"

Suddenly, someone let out a blood-curdling scream and tackled Kathy to the ground. She screamed as her head was bashed into the muddy banks. And holding her down was none other than...

"Frog!!!" Screamed Kathy, sitting up. "I'm going to kill you!!" Frog got off of her and backed away.

"Sorry Kathy. But it was funny!" He said laughing. I saw Liv descend a tree, and I figured that they were both in the trees, just waiting to scare us.

"FROG, I'M GOING TO GIVE YOU YOUR NICKNAME AGAIN!" screamed Kathy.

In the 30 seconds I stopped watching them, Kathy chased Frog around with a frog she picked up.

Poor frog.

Frog got his nickname back in second grade when he kissed a frog because of a dare. Ever since then, he has been telling people to call him Frog.

"Come on!" I said. "Let's get to the river!" Kathy stopped chasing Frog with a frog, and we all started walking towards the river.

But when we got there... "What happened?" Liv said in shock. And I agreed. Instead of clear, sparkling water, the water was a dull brown. I saw plastic bags floating in the water and in the bank. Frog walked towards the river and kicked the mud. He howled in pain and grabbed his foot.

"There is something in that mud!" He said.

We crept closer and examined the mud. "Is that...?" I said. I pushed away the mud and revealed... "A SINK!" I cried. "A kitchen sink!"

"What happened to the river?" asked Liv. "I've never seen it so dirty!"

"I don't know. But I'll figure this out." I said and walked back to my house

"Hey Mom?" I asked her. "We went down to the river today, and it was completely dirty and gross!"

"I feared that this was going to happen."said Mom sadly. "People keep throwing trash in the river, so it gets all gross and dirty. And I feel bad, not just for you, but people use that river for fishing and swimming, and for playing in it. But if it's all dirty, no one can use it!" That got me thinking.

"Mom, could I borrow some gloves and plastic bags?" She nodded and I smiled. We were going to clean up this river.

So, after that fateful meeting at the river, Liv, Frog, Kathy, and I grabbed bags and cleaned up the trash. And we sent an example to all the other kids in the neighborhood. Every other week, we went to the river and cleaned up. This also got the attention of our mayor who (with our help) passed a law that people couldn't litter.

That made all of us so proud.

And now when we watch kids playing in the cool, clear, safe water of the river, we feel like we finally gave back to the community and our Earth.

Source

Environmental Protection Agency. (n.d.). **How's My Waterway?** EPA. *www.mywaterway.epa.gov/community/beloit,%20wi,%20usa/overview*

CREATIVE WRITING CATEGORY

2nd Place (IL)

Marsha Srinivasan, Naperville IL

Marsha is 14 years old and loves painting, drawing, playing viola, and cooking. Her favorite subjects in school are English LA and Orchestra! Marsha says, "After a long, hot day, I love drinking ice-cold water to refresh me and keep me hydrated!"

MARSHA'S ESSAY

A Drop Of Water

The crisp, airy wind breezed over West Branch DuPage River, caressing the little droplets it came across. It was a vast river, spanning 35 miles. In that water resided Drippy and Droppy. They were a playful bunch, having an unbreakable bond glued by life, oxygen, and purity.

Each day, volunteers would clear up the river to get rid of the impurities that occupied their area. Knowing that people cared about their lives always made their day, keeping them fresh and healthy.

Flowing off into the lengths of the river, Drippy and Droppy always followed their fellow droplets. Every once in a while, they would come across a plastic straw or two – or a bag – or some fertilizers – or...whatever. It broke their hearts that humans would put such things in those precious waters, but they showed forgiveness, the benevolent trait that comes with being a water molecule. After all, the river was used for things like kayaking and drainage. Not to mention, there were a couple of dams built too. These things were destined to happen.

Drippy and Droppy just went on with their day like normal. However, Droppy was feeling a little under the weather.

Drippy asked him, "Are you alright Droppy?"

"I'm ok, my oxygen level is probably just a little low," he said reassuringly, "it should return back to normal in no time!"

"Well, if you say so..." said Drippy, while worry brewed in her mind.

But to Drippy's dismay, Droppy never got better.

Drippy and Droppy went to see Dr. Drop.

"Dr. Drop, Droppy's been feeling awful lately. Do you know what could be wrong?" asked Drippy.

Dr. Drop carefully examined Droppy and came to a conclusion. "It seems like Droppy's oxygen is dangerously low," said Dr. Drop.

Droppy desperately asked him, "Oh no...what can I do to get more oxygen?"

"Make sure to stay out of nutrient-polluted areas, otherwise you will eventually reach hypoxia," said Dr. Drop. "Remember, it is not only your responsibility to stay out of there, but the humans' responsibility to manage the nutrient levels."

Drippy and Droppy made sure to listen to Dr. Drop, and they stayed out of those areas. Droppy was starting to get better, until one day something dreadful came through the drainage. It was a load of fertilizer that someone had dumped. The moment it made contact with Droppy, his oxygen was gone. Droppy had reached hypoxia. Drippy desperately tried to escape, safely making it out of the contaminated zone.

For the rest of her life, Drippy had to live with the sorrow of a dead fellow droplet. CS

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