the weekly anthropocene

dispatches from the wild, weird world of humanity and its biosphere

By Sam Matey

Local Leaders: An Exclusive Interview with Ms. Amarachukwu Ifeji

Amarachukwu Ifeji (pictured) is a young activist and environmental scientist from Bangor, Maine. Her pioneering phytoremediation project, "Testing the Effectiveness of Mycorrhizae in the Phytoremediation of Heavy Metals From Stormwater," won best in category in both the Maine Science Fair and the Intel Science and Engineering Fair. She also founded the Multi-Cultural Student Union at Bangor High School, works as a grassroots coordinator with the Maine Environmental Education Association, and was recently awarded the Mainely Character scholarship and named a National Geographic Young Explorer.

A lightly edited transcript of an exclusive interview with her follows. This writer's questions and remarks are in **bold**, Ms. Ifeji's responses are in regular type. ***Bold italics*** are clarifications and extra information added after the interview.

There are so many things I want to talk to you about! Let's start chronologically, if you will-how did you first become interested in environmental science issues?

I had a passion for the environment from a very young age. I remember always wanting to engage with the outdoors. But as a lower-income BIPOC youth living in the DC metro area, there weren't many opportunities to engage with the outdoors. Besides recess, I had really no formal outdoor learning experiences or environmental education. And I don't even think recess counts. A lot of the opportunities to engage with the environment, and how my passion really grew, was through self-sought learning opportunities. I think the biggest one was my attending the stormwater management and research team summer institute. The summer going into my sophomore year of high school, it was at the University of Maine. I was able

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to engage with water quality, water justice, and learn how to sample. That's where my environmental steward was born. Since then, I just really became impassioned by citizen science efforts and making change in the world, resolving some of the biggest threats to human livelihood.

You've also dealt with a lot of racism and xenophobia, and you responded to that by founding the Multi-Cultural Student Union at Bangor High School. Could you tell that story?

Since moving to Maine, I've had some pretty big struggles around racism and xenophobia. First landing in Maine, we went to Wal-Mart, and I just remember the feeling of not being accepted. I was only nine years old, I grew up in a community where pretty much everyone looked pretty similar to me, or had at least one thing in common with me, whether or not they were lower income or an immigrant as well. Coming up to Maine, and going to Wal-Mart to get things for our new home, I felt the stares, I felt ostracized. It's pretty indescribable, looking back on it. It was instantaneously upon coming to this state that I felt that, that kind of outcast. In grade school, high school, and my work, that continued. I worked at a pretty public convenience store, a retail store, and I had individuals coming up to me and touching my hair without consent, a lot of that. At Bangor, there was a lot of pretty horrible things I heard in the hallways. Some directed at me, some not. Racial slurs, things etched in bathroom stalls, on buses. Some pretty stark white supremacy culture in classroom settings, completely disregarded by teachers. Because of that, I recognized this isn't normal. I had gone nine years living in Maine. Because of that, my recognition that this isn't normal, finding other students facing such issues, that's what compelled me to form the Multi-Cultural Student Union. And of course there was positive reception at first, but it was after the formation of the group that I started to face backlash. Initiatives and events I wanted to host weren't being passed, after-school panels and things like that. It was disheartening. And so this is what led to, in December of my senior year, a little over a year ago, I went to the city council and school board joint meeting and talked about how there needed to be some changes to the training and DEI ***(diversity, equity, inclusion)*** curriculum in schools. This was disregarded. And so from December to June, it was interviews with Eesha Pendharkar of the Bangor Daily News around our story. I did not imagine that story would be as big as it was. After that, I outlined a list of demands for the school, and as of this moment in time all of them are working towards being met. The petition actually amassed six thousand signatures. There was a formal investigation around our claims, and it found our claims were true. So now I know the school board is working towards a DEI curriculum, there were two DEI officers recently hired. And

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stronger language around if a student feels this way it's not considered bullying, it's racial discrimination, and there will be repercussions. So that's a little bit about the Multi-Cultural Student Union and what came out of it.

Can you tell me about your fascinating work with the Maine Environmental Education Association?

I really do say that MEEA was the thing that transformed the trajectory of my life. I was 16, my best friend and I attended the Changemakers gathering, a network of youth that MEEA houses. At the gathering, we were able to learn about the environmental issues, but also the social justice components of environmental issues. Things like climate change and connection to place with the environment. This changed my outlook. Before that point, I was passionate about the science, graphs, research, citizen science efforts. And after that point, I became passionate about advocacy, training youth about the tools they need to talk to their town council or school board about climate action or sustainable practices. How to lobby the state legislature on climate bills and resolves. And so that really became my focus, because it's really in these different social issues, about how climate change is disproportionately communities that are already marginalized that transformed my lens from climate change science into climate justice. I attended the gathering, 2018, when I was 16. The next fall, I was part of the planning team for the gathering, and just last April, almost a year now, I applied and was accepted as a fellow for MEEA. I worked as a fellow until September, and I basically just told my boss I would like to be hired as staff. So now I'm on payroll. It's weird for me to say these people are my coworkers-they're my family. A couple of the projects we have for spring, one project we wrapped up is that that we had a mini-grant for educators, in two weeks we had hundreds of applications, which shows the need for funds to promote environmental education and make sure that kids, youth have a connection to the environment. That's how youth become environmental stewards, climate action oriented advocates. And so after doing the metrics we recognized we gave funding to one-seventh of all public schools in the state of Maine. We received more funding, and we're preparing to launch our spring mini-grant application. We recently just did our Changemakers gathering, this was virtual, we were worried about-there's this indescribable warmness one feels at the gathering, we were worried about that translating, and it did. There was so

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Maine Environmental Education Association MEEA

much gratitude and appreciation, so many warm feelings around this gathering. We were able to host a panel discussion around changemakers' work, we were able to have six different trainings, a couple of the themes include indigenous sovereignty, climate justice, mindfulness and recognizing our body's needs. MEEA also collaborates with the Nature Based Education Consortium (NBEC), which has a goal of promoting equitable access to the outdoors for all youth in Maine. I'm also very heavily involved in that work. There are different working groups. The Climate Education working group, in 2020 we passed a set of recommendations on to the Maine Climate Council, they actually made it into the final Climate Action Plan. This year, we're going to be focusing on advocacy, gathering youth testimony. The municipal advocacy working group is working on connecting educators, superintendents, school officials, with resources to implement outdoor learning in their schools. We have a communications working group which I'm the cochair of, and this year we're focused on highlighting the stories of BIPOC individuals in Maine, and in their stories engaging with the outdoors. Not just the good stories, but also the bad stories, the ugly stories, and really making sure we tell our network and the wider audience in the state of Maine that there needs to be more inclusivity in outdoor spaces. And lastly with NBEC, I'm also part of the steering committee, one of only two youth on it. It's kind of the board of NBEC. We are passing a resolution, Every Maine Youth Outside, which we hope will be sponsored by Speaker Ryan Fecteau. And this is just about engaging youth outdoors, making sure they have that connection. Lastly, with MEEA, we have another project, Just Me for Just Us, where I work with [Maine State] Senator Chloe Maxmin, and we're really working on making sure rural youth have the tools and resources they need to start action in their local communities. We have training coming up, we're in the midst of hiring our civic engagement fellow to help us with this work. And I was recently asked to join the Equity Subcommittee for the Maine Climate Council, and so we're going to be working on making sure the recommendations don't disproportionately affect those already affected by the climate crisis.

Amazing! So, tell me about your phytoremediation project. You used arbuscular mycorrhizae to filter copper from stormwater, correct? And that was partially inspired by an issue with Bangor High School drinking fountains. Could you walk our readers through what that entails, how you put that together, and so on? After attending the stormwater management and research team institute the summer going into my sophomore year, I had a lot of knowledge and passion around water and water justice. At the same time, the Flint, Michigan water crisis was being highly televised, it was very disheartening. Similarly, at Bangor High School, there were some drinking fountains shut down due to elevated concentrations of lead. So using the knowledge I gained, my research project for the next three

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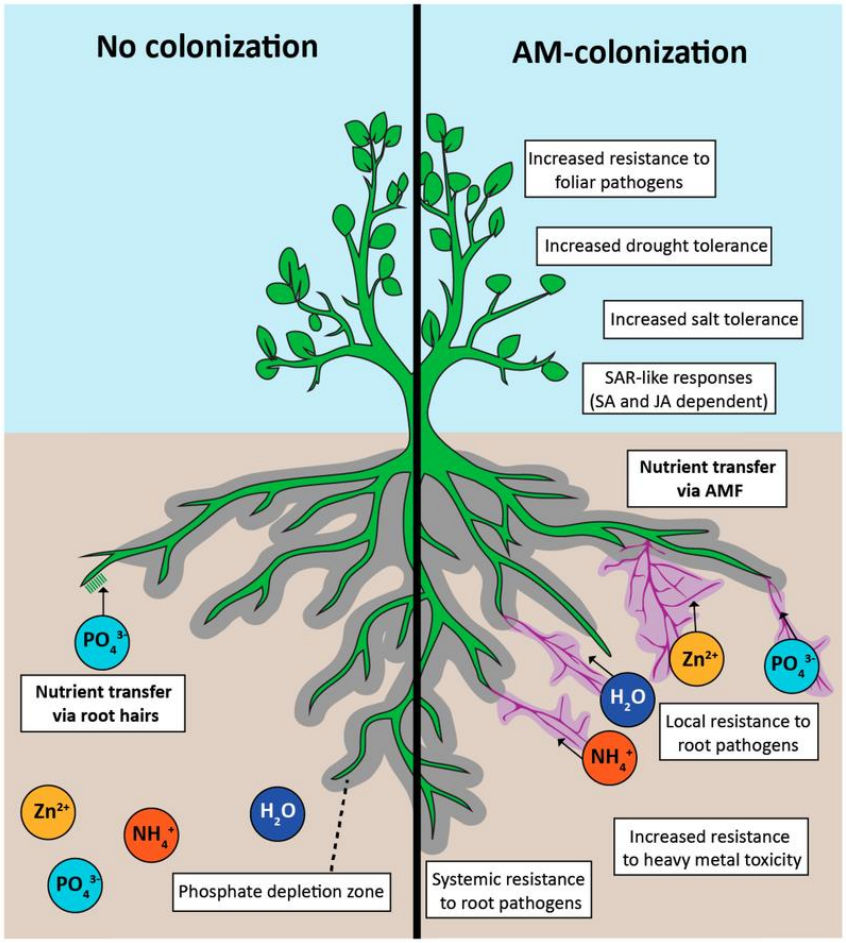
years was mycorrhizae, which as you know are the symbiosis between plants and endomycorrhizal fungi. And seeing whether they enhance the phytoremedation, the plants' removal of pollutants from stormwater. For this project, I grew many new plants. I had a sample size of 196 plants. As I progressed in my research, I became better, my thumb turned green, but initially I had many mishaps. Over winter break, I totally killed three-quarters of my sample size. I thought I had infected my plants with the mycorrhizal fungi, turns out the fungi was no longer viable, so none of the plants had been infected, and I had to grow a new batch of plants. But that only shows research is not one straight shot, it's through learning from those mistakes that one becomes a better scientist. So with the plants, half of the sample was inoculated by mycorrhizae from the local hydroponics store. Mycorrhizae are found in 95% of all terrestrial land plants. So after growing the plants, I simulated a stormwater event, where I watered my plants with a known concentration of copper. In my senior year, I was also able to test lead, after gaining experience with testing copper and zinc my sophomore and junior years. After that, I performed plant tissue analysis using the ICP mass spectrometer to find the exact concentrations of lead and copper in the plant tissue. I found that the mycorrhizal plants were able to remediate, they had 30% more lead and 50% more copper in the plant tissue than the plants that did not have the fungi. After performing statistical analysis, I found there was a statistically significant difference, the presence of mycorrhizae did in fact enhance the phytoremediation of lead and copper from stormwater. (Pictured: benefits of arbuscular mycorrhiza colonization). And so in terms of community-based applicable solutions, what I proposed in my senior year poster for the Maine State Science Fair was to have a constructed wetlands system. Wetlands are like the newest technology, and they're pretty great. I was thinking on a river or small pond, planting the plants around the body of water itself, and the



likelihood there's already mycorrhizae present is pretty high. But making sure that they are indeed mycorrhizal fungi. When storm event is to occur, these plants would act as the first line of defense from the pollutants rushing into the body of water itself. Whatever water is in that soil, the plants would be able to remove the pollutants in the soil from the water as well. For my project, I used hybrid sorghum-sudan grass, mostly from the Midwest region. They can grow upwards of six feet high, they're fast-growing and they have a lot of biomass so they can accumulate a lot of the pollutants that are present.

One issue that's become much more salient in recent years, with the simultaneous rise of the Black Lives Matter movement and climate activism, is the interconnection between environmental and racial justice issues. Can you talk about that, from your perspective as an African-American environmental scientist?

I think that one cannot talk about climate change without talking about climate justice, and how it disproportionately impacts communities of color, LGBTQ+ communities, new Americans, and people of lower income backgrounds. Communities of color are living in areas that one should not be living in. Close to coal plants, to other environmentally hazardous facilities, that is the case with many of these communities. That is why, in terms of a health perspective, BIPOC individuals, particularly African-American and black individuals, have higher rates of asthma, developed by living in close proximity to these environmentally hazardous sites. It is so, so important that when one presents climate change, that they're talking about how it's impacting the lives and livelihood of individuals who relatively have very little to do with the crisis itself. That is really how one becomes impassioned. When presented with data and facts, it is really easy to disregard the information, because it's not connected to a person's life. But when it's presented with, this is the data behind people's lives being impacted, it's so hard to turn a blind eye. That's what will compel individuals to take action on anthropogenic climate change.

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Ms. Ifeji, thank you so much for sharing your story. Thank you so much for joining this interview. It's been a pleasure talking with you.