How to Teach K-12 Students About Climate Solutions in Georgia

Summary

How can Georgia K-12 educators nurture and engage the next generation of climate leaders in our state? In this Drawdown Georgia webinar, "K-12 Climate Education: Climate Solutions That Go Beyond Carbon," moderator Jaimie Cloud of the Cloud Institute for Sustainability Education leads a panel featuring Dr. Donald White of Coweta County School System, Katie Holliday and student Etta Wade of Tybee Island Maritime Academy, and Ramya Shivkumar of Green Cell, exploring how hands-on learning and community partnerships are shaping the next generation of climate leaders.

Key Takeaways

- Jaimie Cloud frames climate change through systems thinking: it's a symptom of global warming, which is a symptom of greenhouse gases being emitted faster than the Earth can absorb them, a "bathtub" imbalance between the faucet (emissions) and the drain (the Earth's absorption capacity).
- Coweta County School System's "Educator Adventures," including a three-day immersive trip touring the Kendeda Building, Fourth Ward Park, BMVW Auto Sales, and solar farms, directly reached 32 teachers, nearly 4,000 students, 11,000 parents, and 80,000 Coweta-Fayette EMC members through a related media campaign.
- At Tybee Island Maritime Academy, a Zoom call with Drawdown Georgia's John Lanier introduced students to the bathtub analogy and the 20 Drawdown Georgia solutions, leading them to launch a food waste reduction and worm composting program and a salt marsh monitoring project through Adopt-a-Wetland.
- Green Cell's youth programs found that identical climate lessons don't translate the same way across different communities, an insight sharpened by their first international summer camp, and that fear of failure, more than lack of interest, is often the biggest barrier keeping kids from taking action.
- All four panelists emphasized that leading with solutions, not doom and gloom, and giving students real ownership over their projects, is what shifts their mindset from "game over" to "game on."

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Jaimie Cloud: Okay, we are going to begin on time — we are educators, we love that. Welcome to Drawdown Georgia's K-12 climate education webinar, we're so happy that you're all here. This is Climate Solutions That Go Beyond Carbon, part of a series of webinars Drawdown Georgia is doing around the state, and for the whole country.

I'm Jaimie Cloud, and I run the Cloud Institute for Sustainability Education, and I'll introduce the rest of the panel as we go. For today, our three big questions are: how can Georgia educators nurture and engage the next generation of climate leaders in our state, how are teachers

employing hands-on learning experiences around climate with their students, and how do young leaders view their roles in the climate movement? Those are the three questions we'll address today.

Drawdown Georgia is a statewide initiative focused on advancing climate solutions in Georgia, but the rest of the country and the world are watching carefully what Georgia is doing, and are very excited about it. Drawdown Georgia takes inspiration from Project Drawdown, a leading resource for taking action on climate change — there's a website and a book, and a new book called Regeneration by Paul Hawken. Many, many resources, and we have a slide at the end with lots of great links to resources available to everyone. Project Drawdown began with 200 mathematicians simply doing the math on what we need to do to reverse global warming, in every sector — farming, fisheries, forests, industry. So if you're a math educator, this is your century.

There will be a Q&A section ongoing — there's a Q&A box on your screen, so if you have clarifying questions, feel free to pop them in the chat. We'll also have a more formal session for Q&A at the end. And one more housekeeping detail — this session is being recorded, and will be posted on the Drawdown Georgia website in the coming days, so you can watch it again and share it with friends and family.

I wanted to introduce myself as an educator for a sustainable future — to me, it's all about what we need to know and be able to do to contribute to the future we want. Three things I chose that we need to know and be able to do to understand what's going on with climate change and global warming: thinking about our thinking, the importance of distinguishing problems from symptoms, and the importance of thinking like a bathtub.

These are just little context setters. Barry Richmond, who was a system dynamicist at MIT, used to say, "All systems are perfectly designed to get the results they get." So it's no accident we're in this situation — we built for it, we bought and sold for it, we educated for it, unintentionally, but this is where we are, and we need to make a mid-course correction, as our beloved Ray Anderson would say.

This is one of the ways of thinking that's gotten us into trouble — a little systems thinking joke we have: of course, if you cut a boat in half, you don't get two boats, it's one boat, and we're all in it, in various places. So we need to work together to turn that ship around. Einstein said many wonderful things, but one we always quote is that the significant problems we face cannot be solved with the same thinking we used to cause them in the first place — it requires a different way of thinking, and education for sustainability characterizes that different way of thinking we need.

One of the ways of thinking is to distinguish problems from symptoms — it's important to remember that climate change is a symptom of global warming, which is a symptom of emitting too many greenhouse gases faster than the Earth can absorb them, which is a symptom of bad design, which is a symptom of old and outdated thinking. It always comes back to education, not just because we're educators, but because it does.

Thinking like a bathtub is all about stocks and flows. In a bathtub, you have a faucet — that's the inflow, and the speed and volume of water coming in is one variable to track — and the drain letting it out is another. Stocks are entities that can accumulate or be depleted, like water in a bathtub, and flows make stocks increase or decrease, like the faucet and drain. If the faucet is

putting in too much water faster than the drain can take it out, your bathtub is going to overflow, and that's the situation we're in with climate change and global warming. The reverse is also true — in overfishing, if you take out more fish faster than the ocean can replenish them, you have the opposite problem. In our case, we've been emitting too many greenhouse gases faster than the Earth can absorb — the Earth loves carbon to a certain extent, but everything in moderation, as we've all learned from our grandmothers.

Those are the three things everyone needs to know and be able to do to understand climate change and global warming: think about our thinking, distinguish problems from symptoms, and think like a bathtub.

At the Cloud Institute, we think of learners as the center of everything — learners are students, of course, but also teachers, parents, administrators, everyone in our school communities. Learners are nested inside our classrooms, with adults and young people learning together. Those classrooms are nested inside schools that learn the organizational policies and practices that make all the first parts of the circle work. Those schools are nested inside buildings, with food, energy, transportation, materials, and schoolyards, and all of that is nested inside our community. So we believe the most important unit of change is schools and communities learning and working together for the future we want — we have all the children and young people legally required to be with us, and we can make great use of that time and relationship.

Now I'd like to introduce our panel. We have four wonderful speakers today, four stories that serve as exemplars of what's going on in Georgia with respect to reversing global warming and educating about it: the science content specialist for Coweta County Schools, a teacher, a student, and a director of a community-based organization. The first speaker is Dr. Donald White, science content specialist at Coweta County School System. Hi, Donald, welcome.

Donald White: Hi, Jaimie, thank you very much. So, everyone, the title of my presentation is "A New Approach to Environmental Education Professional Learning" — I used air quotes on "new," because nothing I do is brand new, it's all modeled off of someone else's work. I draw inspiration from all across the state of Georgia about approaches to professional education for teachers. We chose to focus on teachers because we noticed our teachers, who are all trained educators, don't always have a whole lot of professional experience outside of education. I know for me personally, this is my 25th year in education — my only other experience outside of it is work at Chick-fil-A in Fayetteville, Georgia, from my senior year of high school through my senior year of college, which doesn't really qualify as professional experience with the topics we're talking about.

So we wanted to focus on teachers, because we know that when we impact and empower teachers, giving them the tools they need to take back to their students, they impact those students for the rest of their careers. On this slide are the three partner organizations I'm working with on these projects: the Coweta County School System, obviously, which supplies the teachers; the Coweta County Water Education Team, or CWET, a group of local government organizations — Coweta County government, Newnan city government, our local water utilities, Coweta Water, Newnan Utilities Water, and other industry partners like Yamaha, who happens to be the largest water user in Coweta County. We also partnered, in 2021, with Coweta-Fayette EMC, and I'll share a bit about the work we've done with teachers on environmental education, specifically on the topics we're discussing today with Drawdown Georgia.

Here's my lovely band of teachers — we take this work very seriously. You'll notice somebody in the background, that's literally me falling off the back of this sign, so you caught me in action, which is absolutely typical for me.

We started off focusing on making professional development an adventure — the Coweta Water Education Team set up Summer Educator Adventures. In 2017, we took a group of 25 teachers and followed the Chattahoochee through Georgia. We started in Buford, at the hatchery, looking at water quality there, then moved to West Point Lake, measuring water properties all along the way, which was fantastic — the teachers loved it. So we said, let's expand that — we wanted to see where the water ended up, so we followed it from Georgia to Florida, to Apalachicola. Then we decided to look at the Flint River, following it from the airport all the way to Sapelo Island, looking at how the water and geography were changing along the way. The whole point was giving teachers the phenomenon and experience to talk with their students about what they were witnessing in Georgia — we assume teachers know about all the regions of Georgia, but in actuality, they may not, they may never have been to some of these regions, which is what we found out on these adventures. So we were immersing our educators in these phenomena, then giving them resources to take back to the classroom.

In 2021, with our partnership with Coweta-Fayette EMC, we started focusing on alternative energy — they have a large commitment to alternative energy production and use. The adventure again focused on immersing teachers in the experience over three days. Day one, we spent at the Kendeda Building at Georgia Tech, an amazing sustainable building, a test bed for sustainable building techniques. We stopped at Fourth Ward Park in the middle of Atlanta, a fantastic collaboration between NGO environmental groups and government groups. Then we stopped at BMVW Auto Sales in Union City, right up the road from Newnan, not a place many of my teachers would guess has very innovative environmental things going on. Day two, we went to the Whiteside Solar Farm, Coweta-Fayette EMC's solar plant, where members can purchase electricity directly. We stopped in the town of Trilith, which used to be Pinewood — you may know it as Pinewood Studios, where many of the Avenger films were shot right in our backyard — and we wanted our teachers to see the environmental solutions happening in that space. Then we went to Camp Southern Ground, the largest private solar installation in Georgia. Day three was education day — we spent it at Coweta-Fayette EMC headquarters, met with power industry reps, talked about the goals of the power industry around sustainability and the environment, got to drive electric vehicles — unfortunately the Coweta-Fayette EMC safety rep made us keep the Teslas under 10 miles an hour, which was difficult, but they're so much fun to drive. We also partnered with Green Power EMC, who gave us curriculum resources, and showed teachers how to implement it in the classroom, hands-on.

Some impacts and deliverables from these events: there was a classroom weather station project — one of our sixth grade teachers wanted to install a weather station and have her students study the feasibility of an alternative energy source for powering the school, looking at wind power, geothermal, and solar. Coweta-Fayette EMC reps who were on the trip heard the teacher talking about this and said, in order to figure out if it's viable, you need to collect data, so let's buy you a weather station — so that's what happened. That project led to us presenting on the GPB Classroom Conversations podcast, a partnership between Georgia Public Broadcasting and the Georgia DOE.

We had 32 teachers participate, seven administrators, and industry partners — from those 32 teachers, almost 4,000 students were directly impacted, and of those 4,000 students, 11,000 parents were connected. As a result of a media campaign related to this project, 80,000

members of Coweta-Fayette EMC learned a bit about what we were doing together. That was a huge win for Coweta-Fayette EMC, and for us, because we got so much experience for our teachers. Coweta-Fayette EMC surveys their membership every year to track interest in green technology, and 79% of their members support renewable energy — but what shows the most impact for them is their commitment to local communities, demonstrated by engaging our teachers in this project. The targets for this kind of educational experience were teachers, students, parents, EMC members, industry reps — we also talked with folks outside Coweta-Fayette EMC looking at this as a model to replicate, plus media and government officials, since there's new legislation related to renewable energy coming up, and they wanted government officials to see how they were approaching it.

When we do these Educator Adventures, one of the things we focus on is food, because we've noticed that when you feed teachers very well, they tend to have a much better attitude — so we stopped at The Varsity for lunch. After lunch we stopped at Fourth Ward Park, which is a retention pond — you probably have retention ponds near you, probably ugly, surrounded by chain link fence, maybe some frogs in them, who knows — but this Fourth Ward Park is a beautiful facility that resulted in a billion dollars of development springing up around what's essentially a glorified retention pond. We showed teachers the connection between creative problem solving and industry and government.

We had plenty of swag for them too — teachers will take it from you if it's not nailed down, so you might as well give it to them. Our last stop was BMVW Auto Sales in Union City — their business model focuses on electric vehicle resales, but as a side project, they're also repurposing old hybrid car batteries, like from the Prius, into battery storage towers for home use. A lot of the questions we get about this kind of stuff are, how are we going to reuse all these batteries once everyone goes electric — well, these guys are showing exactly how to do it, and our teachers got to see that.

Day two, we spent at the Whiteside Solar Farm, and heard from a sales rep in suspenders who was amazing and engaging — our teachers loved him, and we had a great time seeing the solar farm and talking about the options for EMC members to purchase this power. We stopped for lunch in the town of Trilith, and heard presentations from local developers trying to make Trilith the most energy-efficient, sustainable community in the country — a fantastic experience, hearing the realities of solar and geothermal power in a residential setting. These were honest conversations, not marketing conversations — what are the realities? Well, geothermal in Georgia is expensive, and the return on investment takes a long time. That was important for our teachers to hear.

Then we got to go to Camp Southern Ground — again, trying to draw this back to how it impacts students, because we have lots of students in Coweta County who participate there, and their whole experience is powered by renewable energy, the largest private solar installation in the state. Zac Brown, the country performer, put this in place for his camp to run on. Day three was curriculum day, and we heard from industry reps, from Coweta-Fayette EMC about the direction of the energy production industry and the changes coming, from our friends at Yamaha about their sustainability practices — the whole idea being that this isn't something the "hippie tree huggers" are just trying to sell you, this is something industry is actually putting in place because it's marketable, because it can produce profits. Our favorite part of the day was driving the electric vehicles. Then we partnered with Green Power EMC, who gave us curriculum we're working on, and showed teachers how to implement it in the classroom, hands-on.

Our takeaways: number one, make it phenomenal, make it memorable, make it something teachers are going to go back and talk about — remember, if you're working with teachers, they're going to be your force multipliers, they'll take it back and share it with students, and the more teachers you reach, the more students you reach. But those teachers may not have any experience or knowledge about things going on outside the classroom, so you need to show it to them, and make sure whatever you're offering is a strategy, not just an opportunity — teachers have way too many opportunities already taking up their time. We want to make it a strategy, something they can employ right away. If you feed them, they'll come — make sure you feed them well, and you'll get a lot of engagement. And it's not enough to get them to come to these events, you have to get them to implement it in the classroom, and the only way they'll do that is if you walk into the classroom with them, roll up your sleeves. If you bring industry representatives who'll come in and help them implement what you're talking about, you'll get so much more buy-in from teachers — they'll share that enthusiasm with their students, and we develop a whole new group of problem-solvers who can help us with all of this. It's not new, we've had teachers in the field forever, but our approach was very intentional, to make it engaging, memorable, and something they'd be willing to take back and implement.

Jaimie Cloud: It's thrilling, thank you so much. You have about 30 seconds to share one story of student work you found exemplary.

Donald White: Well, if I only have 30 seconds, I've got to talk about my daughter. She's been to the International Science Fair twice over the past couple of years — she does oyster research, working in Apalachicola with researchers trying to improve water quality through oysters and getting them to grow back. She participated in the Stockholm Junior Water Prize, an international water competition, and won an award there. All of that has been influenced by the fact that I drag her on these events with me — so that's a personal connection, but also an example of student connection, and there are other stories just like hers, but she's my favorite.

Jaimie Cloud: Excellent, thank you so much, Donald. Now I'm going to introduce Katie Holliday, a middle grade science educator at Tybee Island Maritime Academy. Hit it, Katie.

Katie Holliday: All right, thank you. This is a picture that represents our school, Tybee Island Maritime Academy — the students actually helped me choose the photo. We're a K-through-8 public charter school located on Tybee Island, and we work really hard — we do project-based learning, we're a STEAM-certified school, and we also play hard, as you can see from the photo, we like to have fun while we learn.

I currently teach middle grade science, sixth grade earth science, we offer high school environmental science to our seventh graders, and this year I'm working with some wonderful eighth graders in an ecological research class focused on science fair. I actually made kind of a crazy connection while Donald was talking — his daughter and her oyster research project actually Zoomed with my students, and inspired a lot of these eighth graders here to participate in science fair this year. Etta, one of my awesome students who's with me, is going to speak about that too.

A couple years ago, I was teaching sixth grade earth science, and on Tybee Island, we're directly impacted by climate change today — we have king tides that can close the roads to the school, which has happened to us a few times recently, and we've started school late because the tides are getting higher and higher. So we were doing a case study project on sea level rise, and looking at the prediction for Tybee Island with three feet of sea level rise, it's kind of a

depressing graphic. So I realized that in doing this climate change education with students, you really have to focus on the solutions.

I had a big change of thinking when I attended a fabulous teacher workshop called Teachers on the Estuary, hosted by the Wells National Estuarine Research Reserve — there was a panel discussion for educators on climate change, and I was introduced to Project Drawdown. I'll never forget one panelist telling me how his own child would get a bit depressed about climate change, and he'd say, "Just go to the Drawdown website, pick one solution, and think about what you can do." That was so meaningful to me that I started doing my own research into Project Drawdown, and thinking about ways to bring this into our curriculum.

At our school, TIMA, we're project-based learning, and we use the design process in everything we do. When thinking about climate change this time, with the next project, I started with, this is an environmental science class, students need to understand how carbon cycles through the environment, but we wanted to keep it local. So we asked students to create graphic representations of the carbon cycle on Tybee Island, so they could get an idea of how carbon is moving around our island, and hopefully the graphics would help them think about potential solutions. That turned into a really cool project — we had a guest artist, Inky Brittany, a graphic recorder who helped the students, and we kept the displays up and referred back to them throughout the project.

Jaimie Cloud: To be able to use that student work as exemplars of data visualization, that's excellent.

Katie Holliday: Oh, thanks, no problem. We also invited John Lanier, who's with Project Drawdown — I just reached out to him by email, invited him to speak to the students, and he agreed. We had a Zoom with him, which was really impactful — he shared a graphic with us and explained the bathtub analogy Jaimie discussed at the beginning of this webinar. That was something we referred back to time and time again throughout the unit, to help students understand the difference between carbon sources and carbon sinks, and how we don't want the bathtub to overflow. So I'm glad you brought that up at the beginning, Jaimie, because that really helped us out a lot, and I wanted to share that with everybody today.

The other thing he shared, and talked a lot about, were the 20 Drawdown Georgia solutions — he shared the five different categories, and talked us through them, and the students were able to begin imagining solutions, thinking about our school and our island, what are some things we think we can do. Based on that, we picked two of the twenty to focus on. We wanted to focus on reducing food waste — food and agriculture was a big one, because we noticed our lunch program, we were doing bag lunches because of COVID, and having a lot of food waste every day, so we decided to tackle that. We also wanted to focus on coastal wetlands, because that's something right there on Tybee that students were already really passionate about, preserving coastal wetlands.

Our first goal was ending food waste at TIMA and beyond — we started with middle grades, and wanted to try to scale up. We found the EPA's Food Recovery Hierarchy pyramid, and students broke into groups based on the topic they were interested in — some focused on source reduction, reducing extra lunches ordered; some were our marketing and PR campaign, getting the word out to the rest of the school about what we were doing; we had a data team recording data every day on how much food was being wasted, to get numbers on how much we could actually save; and then we had a composting team. We started a campaign to make our lunch

ordering system more effective, so we wouldn't have excess lunch orders. We also started a box where people could take food, like bags of carrots or apples, to feed hungry people — some kids took leftovers home to their chickens. And finally, we started composting, which was really fun — the students got really into it, with an engineering design team designing different types of compost bins. We decided on worm composting, and the students wrote a grant, and got about $1,000 from Chipotle, to order supplies and worms so we could start composting food at our school. That was a successful project — Etta was on the marketing team, right, and helped create a lot of graphics for us to share.

Etta Wade: My team won the grant.

Katie Holliday: Oh, yeah, her team actually won the grant — say it again, Etta.

Etta Wade: My team in ELA won the grant, our group — woo-hoo.

Katie Holliday: Yeah, they had to write, it was a writing challenge, and they were awarded this grant to help us get the worms, which are more expensive than you'd think — but they multiply, so that's good.

The second solution we wanted to focus on, something very near and dear to our hearts at TIMA, is preserving our salt marsh wetlands, our salt marsh ecosystem, which is something students worked on throughout the year. They participated in citizen science through Adopt-a-Wetland to monitor the health of the ecosystem, sharing our data with scientists — we actually had a presentation with a local marine biologist at the end of the year, where students reported our data from the year to him and got his feedback on whether he thought the wetland was healthy, which he did, so that was good news. They also created how-to videos to show other people how to monitor wetland health and participate in Adopt-a-Stream, and created nature documentaries to show the community how important the salt marsh ecosystem is, and why it's something we need to preserve. Those were some of the projects that came out of our Drawdown Georgia Zoom that I think were really successful — if you focus on the solutions, and give students those choices, thinking about things that are important and meaningful to them, they'll really get into it. There was a lot of student engagement in both of those projects.

There's one other thing I wanted to highlight, and Etta's going to talk more about this too — the Future Cities competition, an international project open to any middle schoolers anywhere. Last year, the theme was to design a city of the future based on the principles of a circular economy, so through this project, students had to think a lot about how to repurpose materials and design things more efficiently. It was a really great experience — we had one team win a prize for best futuristic design, and they had a lot of fun doing it. It was also a great way to engage community partners — we had Captain Charlie Phillips from Sapelo Sea Farms talk to our students about shellfish aquaculture, and how it's one way to grow food that actually helps the environment, because the shellfish help clean the water. He gave us a bunch of his clams, took me out on his airboat, and gave us about 300 clams so we could have clam chowder while they worked on their projects. We also had a local company called Core Compost speak to students about their passion for circular economy and everything they're doing in our community, as well as Re:Purpose Savannah, a company focused on repurposing building materials — they actually donated some repurposed building materials for students to design their scaled models for the Future Cities project. It's a great way to bring in local businesses and people already doing these amazing solutions, and get the kids to talk to them.

I also wanted to highlight that this year's Future City challenge is focused on climate change — the goal is to choose a climate change impact and design an innovative adaptation and mitigation strategy. We're going to participate in the competition, and if any middle school teachers are out there, I'd encourage you to do the same, it's a very worthwhile experience. With that, I'll let Etta tell you about her experience.

Jaimie Cloud: Before you do that, Etta, one second — Katie, I want to hear from you, one thing that comes to mind when you think about the difference in your students' motivation, thinking, and creativity, when you shifted from "game over" to "game on"?

Katie Holliday: The one word that immediately comes to mind is engagement — student engagement, having a feeling that they can do something is very powerful, and they did, a lot, and they're still doing it, as you'll hear from Etta. It's been huge, a game changer for me as a teacher to have that shift in thinking, and definitely for my students too.

Jaimie Cloud: Nice. One of the principles of education for sustainability is that we're all responsible, because everything we do and don't do makes a difference — so it's not only that we can make a difference, we already do, so be intentional about the difference you want to make, and then make it. Thank you, that's a great point. Hey, Etta — this is Etta Wade, an eighth grade student at Tybee Island Maritime Academy. Here you go, Etta.

Etta Wade: Okay, I'm Etta, I was in seventh grade last year, but last year we did the Future Cities competition, and this is just a couple pictures of my city. One of the requirements was to include a moving part that followed the elements of a circular economy, so we created a little tidal energy thing, because the tides out on Tybee are a lot higher than other places — there was copper wire and a magnet inside, so when the waves moved up and down, the magnet would move and create energy. This project overall was really helpful across all our classes, because it worked with everything — you also have to write an essay, and scale down your whole city and research everything, so it's a great all-around project you can work on in every class, and it also gave us a lot of freedom in what we wanted to do. There were requirements, but we could choose what buildings we wanted, and it was very student-idea-centered, which I think is good, because it helps us feel like we have our own freedom, and it's not just, "write this, do this."

We've also gone out on a couple of trips — last year, me and 13 other students went to Helen, Georgia, for the Adopt-a-Stream conference, we were there for about three days. It was a really good experience to learn firsthand what other people are doing with this kind of project, not just out on Tybee, but people working with freshwater streams and other water-related research. We also went to the International Science Fair Outreach Day, which was really fun, because we got to look at a bunch of other people's work to think about what we wanted to do this year, since we're competing this year — we also got to look at some really cool equipment for testing water parameters.

This year I'm working with biomimicry for my science fair project — I want to design a flood shelter by biomimicking crab burrows, so it's more affordable and effective, which really plays into climate change, since we're on an island and hurricanes cause a lot of flooding, and with sea level rise, it's good to have more affordable, effective flood shelters. A bunch of my friends are doing things also based around climate change solutions, which we all picked ourselves, without outside influence — a bunch of people are doing aquaponics, working with different variables, different light sources, and someone's working with saltwater and freshwater to see if plants can still grow, to find solutions for when saltwater becomes more of a factor.

Jaimie Cloud: One question for you, which may be useful for the audience — help us connect the dots between, say, stormwater runoff solutions, or pick any of these projects, and reversing global warming.

Etta Wade: I'll go with stormwater runoff. All that water running off into streams and the ocean is putting in extra nutrients and chemicals, like fertilizers — if there's too much phosphorus or nitrates in the water, algae blooms, and creates dead zones. So creating permeable surfaces, where water can filter through the earth and filter out those chemicals, really helps reduce water becoming unsafe to drink, or unable to support fish and marine life.

Jaimie Cloud: And does it also help the ocean absorb the carbon it needs to absorb, because if it's dead, it can't do anything, right?

Etta Wade: That's true, correct.

Jaimie Cloud: Interesting, fascinating — and I'm so excited you're doing biomimicry, that's one of my all-time favorite design challenges, I hope you'll compete again. They have a biomimicry design challenge for students, and middle schoolers actually beat some college students last year, just saying. Thank you so much, Etta. Anything else you want to add before we switch to Ramya?

Etta Wade: No.

Jaimie Cloud: Okay, great. Now I'd like to introduce Ramya Shivkumar, director and youth program manager at Green Cell, representing a community-based organization also contributing to reversing global warming. Hit it, Ramya.

Ramya Shivkumar: Thank you for that introduction, Jaimie. Green Cell is a nonprofit organization, passionate about raising awareness about environmental solutions and promoting sustainable ones. We're a group of 50-plus adult and about 40 youth volunteers, and our mission is to help everyone go green — we want to help everyone transition from a wasteful lifestyle to a more resourceful one. We believe in individual and collective action — we focus on the "I" first, then "us," so we aim to not swim against the tide, we aim to change the direction of the tide.

I want to take this opportunity to acknowledge the engineering firm I work for, Windward Engineers and Consultants, for supporting me in my work with the nonprofit — they're the first minority-owned American firm to sign the MEP 2040 pledge, to reduce operational carbon to zero by 2030, and target net zero for all our engineering projects by 2040. Thanks to them, I'm able to be here on their time, supporting Green Cell and Drawdown Georgia.

Why did we start this youth program? An NPR study from 2021-2022 found that climate change has become a politically charged issue, and only 66% of people think it should be taught in schools, and that's where we came in. Even where science concepts related to climate change are taught, among the 505 teachers interviewed, 65% didn't think it's related to the subject they teach — because climate change doesn't just impact the environment, it impacts our economy and society too. It can be hard to capture the complete scope of this topic in one particular subject, unless you have educators like Katie.

I'm not going to go into the standard definitions, because we all know them, but what I'm trying to point out is that those definitions taught in our classrooms don't capture the human and

complex socioeconomic impact of climate change. The kids at TIMA are so lucky to have educators like Katie — it would be great if more schools adopted these models of learning.

We enjoyed talking about a particular movie in one of our youth weekly meetings, about a comet hurtling toward Earth as a metaphor for climate change — our program facilitates those tough conversations, and helps kids verbalize climate change anxiety. Working at the grassroots level means we feel the need to understand why there's a disconnect — why does our brain stop us from taking climate change seriously? There's a term for this, cognitive dissonance, a mental discomfort created by holding more than one conflicting belief at once — this plays a part in our dismissal of climate change. For example, you want to be healthy, but you don't exercise regularly or eat a nutritious diet. No one wants to believe that their daily activities, from switching on a light to leaving screens on at night to using disposable plastic cutlery, are responsible for a global disaster that's already turned millions of people into climate refugees, and killed scores of others.

What Green Cell is trying to do with our youth program is help kids draw the connection between climate science and climate action — reminding people of that connection, and more importantly, that they can do something about it. If we retitled that movie, we'd call it "Don't Just Look Up, Do Something About It." We identified that while most kids are willing to help solve climate change, and worried about it, there are gaps in their understanding when it comes to applying these science concepts in everyday life — a transformation is required in their own lives to demand change for the community around them. Our programs seek to answer a simple question: what can I do, I'm just a kid?

The greatest threat to this planet is the belief that someone else is going to come and save us — whether it's Elon Musk or somebody else. So the youth program is dedicated to leading this change in our communities, because we believe adolescence and early adulthood are ideal times to foster civic engagement — imparting awareness and inculcating environmental stewardship during these developmental periods, we believe, leads to a culture of sustainability.

There's no shortage of resources about climate change on the internet — a quick search gives you hundreds of wonderful resources other people have created. What we found lacking was the translation — we aim to make climate education accessible to kids and adults, and actionable. Our Greener Sunshine week-long camp is structured to talk about one topic each day, followed by an eco activity — our mantra is to make it fun, and we get immediate feedback, because it's a free camp, and if kids don't find it entertaining, or don't think they're learning anything useful, they don't come back the next day. Simple. Over the last three years, we've reached about 300-plus kids.

The kids in the program initiate and work internally in groups on many projects — we want them to solve real-world, complex problems, and turn failures into experiences, so we support intrapreneurship. Two kids within the youth program launched Mission Zelena, an initiative to hand out green missions to elementary school kids. Another group created an Eco Club curriculum, because we found that many Eco Clubs lack mentorship and guidance — while there are curriculums out there, it was hard for kids to translate that into tasks for each meeting. I recently shared the curriculum we developed with my daughter's teacher, who wanted to start a recycling club at school, and she said it helped her cut down so much prep work.

Being a small nonprofit, we felt the need to connect our projects to UN Sustainable Development Goals and Drawdown Georgia solutions, to understand the impact we're making — we've listed

our projects into awareness, action, and advocacy, and mapped each into the kind of impact it makes relative to these goals and solutions. About a third of methane emissions come from landfills — according to Drawdown Georgia, we can reduce one metric ton of CO2 in Georgia by diverting two million tons of organic food waste from landfills to composting, and reduce another metric ton by recycling at least 20% of currently disposed paper waste annually. We wanted to showcase the power of crowd-solving — while a top-down approach to climate change is faster, we believe it's equally important to encourage grassroots-level change that's very long-lasting. You can see volunteers collecting glass, 70 Green Cell families composting, and the collective impact of those actions.

There are different aspects to the youth program — Green Cell education is one, where we take kids on site visits to places like the Autry Mill Nature Preserve, the Gwinnett Environmental Center, or a wastewater treatment plant, to help them understand what's going on in the community, and how it relates to climate action. Green Cell kids have initiated several projects — this year we hosted our first international summer camp, and learned so much about environmental justice, and how our content needs to be modified to factor that in. Our We Care team curated an orientation course for new kids joining Green Cell, so they understand fundamental climate change concepts, using resources including Drawdown Learn — the team curated the content and helped with the new member onboarding process. We also encourage kids who want to work on their own eco-service projects — for example, Pradyun, who's helped recycle more than 3,000 pounds of glass from his subdivision alone over the last two years.

We also want to encourage collaboration with amazing organizations, because we don't want to reinvent the wheel — we've participated with Trees Atlanta to plant more trees, and with MedShare to rescue and donate medical supplies to developing countries, saving lives. We hope that through these efforts, kids learn that the sphere of influence is limitless — whether you're interested in art, science, medicine, or engineering, the opportunities to engage with the community are limitless.

We also have a Green Cell campaign — we want kids to spread the message and make it actionable, so we collect metrics on how much water was saved, how many plastic bags were refused. We recently launched the Solarize Forsyth Ambassador program, encouraging youth to participate and spread awareness about the countywide Solarize initiative. We want as many kids as possible to feel like, hey, this is something I'm interested in, I want to participate — it's not just for kids already interested in environmental science.

We encourage kids to participate in advocacy efforts too — our youth advocated for ocean climate action during the National Ocean Climate Action Lobby Day, in April of last year, as the only youth-led contingent from Georgia. They call themselves Youth for Ocean Climate Action, and hope to raise awareness among Georgia leaders and kids about how climate change impacts vulnerable and coastal communities — their change.org petition, shared with many of their school peers, got 2,500 signatures, and they won a spot to showcase their efforts at Georgia Tech's Global Climate Symposium.

We love this quote from Brené Brown, because she has the ability to translate complex concepts into simple visuals: "The world is shaped by the stories we choose to hero." I want to thank all the Green Cell volunteers, the kids and their parents, for putting in the work on weekday nights and weekends to make a difference, and for the generosity of so many people with their time and money that's helped us move forward. We also want to thank Drawdown Georgia for choosing to showcase such wonderful initiatives by everybody on this panel — I'm so humbled

and honored to be here, presenting this information and learning from all the other folks on the panel. Thank you.

Jaimie Cloud: Thank you so much, Ramya. One question for you — what's one thing you've learned from this most recent work that was maybe a little surprising, or any powerful learning you can speak to?

Ramya Shivkumar: I think the most powerful learning for me has been — we set up these summer camps the last two years, and they were really great, but the kind of people signing up for those camps probably belonged to the same socioeconomic strata. So when we were talking about what you can do as a kid, we talked about switching off the light, turning down the air conditioning, setting the temperature to 78, 68, carpooling, no idling — so many of those solutions. When we launched our international summer camp, and had more than 100 kids participate from India, we had to rework everything, including the emails we sent, where we'd encouraged them to log in using a laptop — we had to think about that, because those kids may not have a laptop, they may just have a small cell phone, they may not have cars at all, they may not even have a bike, they may not understand the concept of air conditioning because they don't have it. So much of that content had to be modified to cater to those children. We understood that the same solutions, or the way we approach them, may not apply to everyone — which is sort of how Katie showed how the carbon cycle relates to Tybee Island specifically. That translation is really important, because otherwise we lose so many opportunities, and that's one of the wonderful things about Drawdown Georgia, because it's catered to Georgia specifically.

The other thing I wanted to stress is the fear of failure among kids today — we need to create a platform where there's no fear of failure, where they're allowed to explore and fail, and fail gloriously, fail fast, so they learn from that experience and continue to pivot until they find that optimum solution, because there's no perfect solution, just one that works right now for everyone, or most people.

Jaimie Cloud: Nice, thank you, glad I asked. So now we can transition into the Q&A and information-sharing section of our program. A couple of things — if the speakers could put your names and contact information in the chat, that would be useful, a few people have requested that. I know it's also on the slides, but people want to know how to get ahold of all of you.

I'm also going to read a couple of questions we've already gotten, but I'm inviting all of you listeners to ask questions too — pop them in the chat, in the Q&A box, because we're ready to have a conversation. The first one — we have Jay Bassett, who's in Georgia, and has been an advocate for sustainability and environmental education for many years, most recently through the U.S. EPA. He's offering a resource on food waste, the World Wildlife Fund's Food Waste Warriors program, a USDA/EPA audit guide, which he's popped in the chat box. And, as he's sharing, the production of food is the number one most impactful activity we do on the planet. I always say to people, when they talk about needs and wants, that we should focus on what we need, not what we want — well, food is one of those things we need, but just because we need it doesn't make it sustainable, and just because we want it doesn't make it unsustainable. So shifting toward a sustainable, even regenerative, food system, leaving the place better than we found it, is really the only direction that makes any sense.

One more from Jay: "What's the role of schools as a community and formal education asset, as part of the broader set of efforts and coalitions in supporting equitable and sustainable

community development?" To me, the involvement of schools means the involvement of children and young people and their teachers — whenever I speak to municipal or corporate leaders, I'm always surprised they haven't reached out to their school systems, saying they want to move toward a sustainable future, but where are they going without all the children, young people, and teachers? To me, schools are the secret sauce, and children and young people are what will make it successful — we need the adults too, we're not just handing over the problems we've got, we need to work together. Schools play a vital role, and we want to make sure we know what our unique contribution is as educators and students, so we're all playing our role.

One question that's come up — what have been some of the challenges you've faced, and maybe one you were able to overcome? Anybody got a good story?

Katie Holliday: I guess I'd say, with teaching, anytime you're trying something new, you constantly have to change what you're doing, rework how a project's going, think about different ways to organize things. That's just part of the design process — you're trying something, you go back, you revise, it's constant.

Jaimie Cloud: Yep, it's an iterative process — we like to say, read the feedback and self-correct. Any other challenges you want to share?

Ramya Shivkumar: I'd say that the sense of urgency is lost on a lot of people — working at a grassroots level, that's a challenge we always have to encounter. We haven't found a perfect solution for it, we're still trying, but I think as more people come to know about this, and about different community partners we can work with, those challenges will go away, at least I hope so.

Jaimie Cloud: Yeah, and that reminds me, one of the things we've learned from brain scientists is that it's very difficult for humans, with our reptilian brains, to see the results of our actions when they're removed in time and space, and not causally observable. So sometimes it's difficult for people to see the results of their own behavior — making the feedback visible, so people can see the results of their actions, is so powerful, and all of you are exemplary at demonstrating the power of data visualization, making that feedback visible, showing the relationships between the parts.

A few other things I noted, evidence to me of educating for sustainability: you're all solving more than one problem at a time, and minimizing the creation of new problems, which is the definition of a sustainable solution — win, win, win, wins. We're all responsible for the difference we make, taking responsibility, reading the feedback, iterating — all of you were great examples of that. Solutions are local, another principle of education for sustainability — yes, we can share, and one of the powerful things about Drawdown Georgia is that your solutions will be appropriate to Georgia, and others can still learn from what you're doing, from the questions you're asking. Maybe the answers will be different elsewhere, but we can scale this work up dramatically by sharing information, questions, and challenges, and how we've overcome them. And the last thing I see evidenced is the assumption that a healthy, sustainable future is possible — it is game on, and we will reverse global warming. There'll be a delay in the system, it'll take a while for things to stabilize in a new regime of dynamic stability, but we are going to do it — as I mentioned, we have all the children and young people working with us, and that's a powerful source.

We've got a couple more things — somebody asked Ramya, does Green Cell work directly with students through the free summer camps, as opposed to teachers, and do you serve Forsyth County or a broader area?

Ramya Shivkumar: Yes, we do serve Forsyth County. It's directly with children, more like an after-school program, but we do love to work with teachers too, provide them with resources, mentors, help them, because there's so much burden on them, and if we can help as a community partner lessen that burden, remove some roadblocks, we want to do that — like I mentioned with the recycling club for my daughter's school. Those are the kinds of conversations we want to support and help with in any way we can.

Jaimie Cloud: Wonderful, excellent. If anyone has any final comments, we're about to transition to the resources and our thank-yous. One more round — anybody like to say anything? I've got one last note from Jay Bassett, that the number two most impactful act is about our built environment — buildings are a huge contributor, and it can go either way, to regeneration or to trouble. So focusing on school buildings and operations, municipal buildings and operations, as well as homes, is another huge area.

With that, let's transition to that last slide of resources — we've put together a list of links for you, and we've vetted all of these. There's a lot out there, and I don't think there's a lot of great stuff out there, honestly — there's a lot of education about unsustainability, and not education for sustainability. So you want to make sure the resources you're using do what these folks are talking about, which is making sure that as we introduce the challenges we're up against, we're also introducing the solutions. Brain scientists say we sometimes have to exercise our "free won't," so we understand why we have to exercise our free will to do something differently — we need to understand what's going on, but only so we can actually do something about it, and get to the future we want. This is a wonderful set of resources.

Everybody has put their contact information in the chat, and I'd like to thank everybody for being here with us, and for understanding the important role K-12 education plays in contributing to the shift toward a sustainable future. Thanks on behalf of the panel and Drawdown Georgia, I'd like to thank everybody one last time. And remember, this is being recorded, so you'll be able to see it again if you choose, and please share it with everyone you know.