

20.10.03 Predicting Hotspots Hour.wav

SM Sarah McConnell

AS Audio Sample

AB Atin Basu

CJ Christie Jones

JG Juan Garibay

MF Mark Fink

SM Christie Jones will never forget. She was studying conflict resolution in other countries. When George Zimmerman was acquitted for the murder of Trayvon Martin.

AS In the circuit court of the 18th Judicial Circuit in and for Seminole County, Florida, State of Florida v. George Zimmerman. Verdict: we, the jury, find George Zimmerman not guilty. So say we all.

CJ I kept waiting to see, aren't we gonna call this what it is, which is terror? Aren't we going to say that this man had been radicalized by racism?

SM From Virginia Humanities, this is With Good Reason. I'm Sarah McConnell. Today, Homeland Security and civil conflict. A new tool designed to predict the likelihood of civil conflict erupting in various parts of the globe has ranked America high for likely civil conflict. Professor Atin Basu and his colleagues at Virginia Military Institute developed the computer algorithm. He says the biggest predictor of future conflict is past and ongoing conflict. Atin, when you say artificial intelligence can be used to forecast where there will next be civil conflict even five years down the road, what sorts of conflicts are you thinking of?

AB So think Syria, for example. That's the most common kind of conflict we have these days. So, first of all, conflict is actually pretty rare. So let's get the good news out of the way. But when it happens, it happens in - in very, very bad ways. But that kind of conflict is really not between states anymore, but it's really sort of within states. And so that's one of the reasons why we're looking at civil conflict.

SM Steven Pinker has famously suggested that violence is on the decline. Is that what you're saying, that wars between nations is on the decline?

AB Yes. With that said to the people where this is happening, this matters a lot. And really, I think the only kind of conflict we should, we should kind of countenance of the percentage should be zero. And so even though it's kind of become smaller, the hope is that it's gonna go away completely. And if we can predict these kinds of conflict, we feel understand what kinds of things, kind of, let these conflicts happen, I think we'd be better placed at bringing these conflicts down to zero.

SM So when you say machine learning and artificial intelligence can predict these conflicts. What did you and your partners do? You basically came up with a computer program and tested to see was it accurately predicting?

AB That's right. I will make one point, though, that I tend not to like to use the term artificial intelligence because I don't think these programs are that intelligent. You know, they do what you tell them to do. So in that sense it's sort of more machine learning than artificial intelligence. We're trying to predict five years out, that's kind of one part of it. So the

algorithm says, well, here's what ought to happen. Now we want to see, well does that really happen? But we want to play this algorithm in a part of the data set that it has never seen before. Because you know, it's easy to sort of predict things if, you know, it's already happened. So the true test is, can you actually predict things that you have never even seen before?

SM So did it know that the U.S. would invade Iraq?

AB So remember, we are looking at internal conflict, so we're not even thinking about these interstate kinds of things. However, it did identify kind of hotspots that, as it turns out, were hotspots. Now, it missed some as well, it's not perfect.

SM Name a few that it caught and a few that it missed.

AB It identified, you know, Syria, for example, it identified ISIS in Iraq and all of that. It missed some of the South American conflicts that were happening during, you know, the 1990s there in Colombia and so on and so forth. It also kind of identified, and just to point this out as well, countries like Turkey, for example, India, for example. Which India actually has had a lot of internal conflict, the Maoist insurgency in eastern India, for example. So, so it did catch those. But what was surprising was, it actually placed the United States in a very, very similar space in terms of the likelihood of civil conflict.

SM When did it place the U.S. in a similar state? Over what period?

AB So basically, we're saying that the United States had almost 65 to 70 percent chance of getting into civil conflict in 2014 to 2019.

SM Wow. So you mentioned the U.S. is not low on the scale for potential conflict within the nation. Where does it rank among the nations of the world would you say?

AB It was pretty high. So, you know, if you think of sort of a heat map with the yellows being kind of low conflict and red being very high conflict, you know, the U.S. was sort of orangy - so not wildly high, but pretty high. And the U.S. was more likely to be in conflict than pretty much any country in Europe, for example. And it was as likely to be in conflict as the Russian Confederation, but not as likely to be in conflict as the countries in South Asia, for example, or, you know, Syria and Libya or the Sudan or something like that.

SM That's really interesting and disappointing. Why do you think that is?

AB So, I would think a large part of it has to do with the issue of governance. But there's another element, and this might be a good thing or a bad thing. And we feel like culture tends to matter a lot. So those were sort of the things that I think put the U.S. in a place that isn't in a very non-OECD space. So the OECD is sort of the rich Western countries, democracies, and so it is very surprising to see the U.S. in that particular group.

SM Were you surprised to see the U.S. high up?

AB I really was surprised. In fact, one of my co-authors on the book, John David, shout out to John. He mentioned at one point that when he was running some of these things, he found that there was a similar situation in the U.S. back in the late 60s. And I think that should give us a little bit of a hint for, you know, what kind of structural social changes were driving some of these conflict issues.

SM Well go back to what are the top factors that signal future conflict sites? There many factors, right?

AB The largest single predictor of conflict was past conflict, whether the country was actually in conflict or not. That signifies this thing called path dependence. So basically, if you're on a path in conflict, you sort of stay on the path. By the same token, if you're not on the path to conflict, you can stay off it, even if there are other variables that tend to predict conflict. In terms of what it indicates, I think what it does indicate is that culture is sort of learned processes can actually help - help us understand why conflict becomes so persistent.

SM Right, so if you think of a warring marital couple or you think of somebody who is quick to anger and fight, that would certainly be the case on the individual level, right?

AB That's right. And I think that's part of what might be happening, you know, within these countries. And at the end of the day, it's individuals who are fighting. Right. And so if you're caught in sort of a cultural context where there's fighting going on all the time, maybe that's all you know and that's all you do, even if there are sort of other kind of factors that might mitigate that effect.

SM Were there any other big predictive factors among the 90?

AB So the two that I thought was, you know, very interesting, one is called credibility. How credible is government policy? So if government policy is not very credible, if people don't believe it, the likelihood of conflict seems to go up. The other one is transparency. It's not just about elections, which we often think of democracy as just being a matter of elections. But really, it's about, you know, whether government is accountable to the people or not. That particular variable was also pretty important in understanding why the country went into civil conflict.

SM Some of the other factors include GDP and rainfall.

AB It's interesting you brought up the issue of rainfall because, when one thinks of rainfall, for example, there might be droughts and droughts increase economic scarcity, and that leads to conflict. That's sort of one story and it's a plausible story. However, that's mediated by government institutions. Governments that are transparent and credible can mitigate the effects of droughts, for example. And consequently, what really matters as a approximate kind of predictor for conflict is really those governmental institutions.

SM So was there anything, as you and your partners were feeding information into this algorithm that shocked you?

AB I actually thought, just straight up democracy would end up being kind of a much higher predictor than it ended up being. Just having elections and political parties and parliaments, those structures did not matter as much as the nature of democracy. Philosophically, for example, you know, think about what is democracy supposed to give us? It's supposed to be a transparent government that's credible, that people believe in, that's legitimate. And so it's that part of it that really matters rather than the structures of democracy. So that was quite you know, that was quite surprising, you know, to me. The other thing that was surprising was how much income inequality didn't matter. I would have

thought that, you know, vast disparities of income would be a good predictor of more conflict. But that didn't end up being the case. So that was surprising as well.

SM Given that your algorithm revealed that the U.S. was fairly high on the predicted conflict zone list, what advice might you have to the current or future administration on how to use this tool to think about best practices going forward?

AB I think if you were to look at this issue of cultural salience, I would hope that an administration would really kind of focus on a sense of cultural unity that - that allows people to be the best that they can, which really is the promise of our Constitution at some level. So that kind of a cultural kind of aspect would be helpful, because we want to stay off the path of conflict. Because we know that once we get on it, it's really hard to come back. And so that's that's one part of it. But at the same time, what kinds of cultural issues would help reduce conflict? Well, I think we go back to the notions of transparency and credibility when people are uncertain about the future. You know, they start to think in terms of what they can get for right now. And I think that might be part of the source of conflict. I mean, you know, think about people sort of going nuts on Facebook, for example, or Twitter or whatever. And you know, people don't think about the future consequences of their - of their kind of actions or words and how it might impact others. That feeds into this general kind of sense of uncertainty about the future. And I think that needs to be tamped down. At the same time, government needs to be transparent. And so we need to know what our government is doing. We do know why it's doing it. And we do have government - government be accountable for what it does.

SM Well, Atin Basu, thank you so much for talking with me on With Good Reason.

AB Well, thank you so much. I really appreciate this opportunity. And I should point out that I really like your show. I learn new things every day.

[00:12:07]

SM Atin Basu is the Roberts Professor of Free Enterprise Economics at Virginia Military Institute. He's a co-author of "Predicting Hotspots: Using Machine Learning to Understand Civil Conflict". Coming up next, how the murder of Trayvon Martin shifted the focus to domestic terrorism. The Department of Homeland Security was created in the wake of the terrorist attacks of 9/11 to secure America from outside terror. But my next guest focuses on homegrown terrorism within America's borders. Christie Jones is an undergraduate academic adviser and field experience coordinator at George Mason University's Jimmy and Rosalynn Carter School for Peace and Conflict Resolution. Christie as the daughter of a former U.S. ambassador who lived all over the world. Where was your father Ambassador, and which countries did you live in as a child?

CJ My father was ambassador in Guyana and he started his post there in 2007 and then retired in 2009. But prior to that, he served other assignments for the State Department around the world. So I grew up in the Dominican Republic, Costa Rica, Thailand and Belgium. And then after I graduated from high school in Belgium, I returned to the United States for college and he continued to travel.

SM I understand that when you did come back to America from overseas, that you experienced culture shock, returning as a woman, as a black woman?

CJ I did, absolutely. Having grown up without race being a big factor in my life and returning to a country where it was, was very difficult for me. Though race is an issue in Latin America and the Caribbean, being an American sort of superseded that, and being a diplomat's daughter superseded that. So race was not something that I had to deal with on a regular basis. And that was a huge shock for me when I came back to the United States.

SM In what ways? What were some of your first experiences and tastes of, this will be different?

CJ When I came back to the United States, I started my college career at the College of William and Mary in Williamsburg, Virginia, and the social aspect was extremely different. It felt to me, with some exception, that black students socialized with each other, white students socialized with each other, and there weren't a lot of other ethnicities or cultural groups present on the campus at that time, was very odd for me. I was very accustomed to going to international schools that allowed me to be exposed to, and be friends with, and socialize with people of all cultures, all different races from around the world. So that was a huge change for me coming back to the United States.

SM What year was that?

CJ That was in 1990. So I started at William and Mary in 1990. I left William and Mary in 1992 and then transferred actually to a historically black women's college in Greensboro, North Carolina, Bennett College.

SM But interestingly, also a culture shock.

CJ Yes. Oh, absolutely. Going to an HBCU as someone who didn't understand what it was to be Black in America was certainly an eye opening experience. I am deeply grateful to Bennett, I'm deeply grateful for the women there for helping me see myself, understand myself, to be surrounded by black women who were intelligent and strong and powerful and black faculty and black academic leadership who were who are about my success, while I was sort of still going through this culture shock. It was really, really hard. It was really tough, but I would never change it. It was - it was one of the best things that ever happened to me.

SM When did you start working for the U.S. government and Homeland Security in particular?

CJ I began working for them in 2011, with the special inspector general for Iraq reconstruction. I actually started as an intern there and then began working with them full time.

SM Homeland Security was created in the wake of the terrorist attacks on the U.S. on 9/11. Your own views on where America is most vulnerable to terrorism changed since you first started working with Homeland Security. How so?

CJ I went through a process of change after the murder of Trayvon Martin in 2012. I was very determined before Trayvon Martin's murder to focus internationally, to work on post-conflict reconstruction. Terrorism, particularly from external forces and homeland security in terms of. Radicalism outside of the United States and with the murder of Trayvon Martin. I began to question that. I began to question how domestic terror was being defined and how mitigating it was operating within the United States, because I've realized very quickly

after his murder that what could kill me here in the United States is not someone from overseas radicalized to a certain ideology, but someone right here, right in my community. And that really changed my perspective. And it moved me from understanding or looking at homeland security and national security to looking at human security.

SM And why do you think it was Trayvon Martin's murder by George Zimmerman, that he was just a child trying to get some candy and a drink, walking across the landscape of a neighborhood to his house?

CJ Yes, it was - it was the idea that, you know, Trayvon Martin could have been my brother. And it wasn't just the fact that he was shot. But it was the fact that he was chased down and that the murderer thought it was his right to take his life because he was suspicious of him. That really, really deeply affected me. And because I didn't hear the language about terrorists referring to Trayvon Martin's murderer the way we do about terrorism happening outside of the United States. I kept waiting to see, aren't we going to call this what it is, which is terror? Aren't we going to say that this man had been radicalized by racism and the fact that it not only never happened, but that he was acquitted of his crime, just - it was it was beyond, it was beyond. That's the only word I can think of. It was beyond. I could not understand it, because here I am studying the multiple ways in which the United States is working to secure its borders, to - to secure its, you know, its national security, to engage in peace building and peacemaking overseas. But we cannot do that for our own citizens in the United States? And that we're not willing, whether it's him or the gunman who killed nine at Mother Emanuel Church in South Carolina - the fact that we're not willing to call these people what they are, which is terrorists.

SM And then what happened with you and your career path and studies in the wake of that?

CJ So I did continue to work on a project specifically funded by the Department of Homeland Security. But my studies had changed, focusing on social justice and meeting the human needs of all people within our borders to augment and support Homeland Security objectives and aims.

SM You're also working at the John Mitchell Junior Program for History, Justice and Race at George Mason University. Is that a relatively new institution?

CJ It is. It was founded last year by Dr. Charles Chavis as part of the Jimmy and Rosalynn Carter School for Peace and Conflict Resolution.

SM What do you find there that resonates with all that you are trying to accomplish?

CJ Oh, goodness, so much. I think working with the program has been a tremendous opportunity for me to better understand the social justice movements that are occurring throughout the United States. The program is very much involved with all of the movements that are happening right now, particularly focused on humanization and empowerment of Black lives, and has moved me into looking at history and social justice as a key part of peace building and peacemaking here in the United States.

SM How do you see the movement we're in right now, the movement this summer for racial and social justice in the continuum, going back to the Civil War and then Jim Crow and the civil rights movement?

CJ I believe wholeheartedly that this is just one small part of larger movements of humanization within the United States. Many people like to compare the movements that are happening now with the civil rights movements of the 60s. And quite frankly, I don't think the civil rights movements of the 60s ever ended. And I think this is just an extension of movements that, as you said, had started long before even emancipation of slaves within the United States and a different manifestation for a different generation. I don't think it ever ended.

SM How does police brutality figure into all of these movements? Not just what we're seeing right now. Can you step back from it and see a larger picture for us?

CJ Oh, absolutely. Absolutely. Law enforcement, whether it's state, local and federal, has had a difficult relationship with communities of color. That's to put it lightly since the founding of the United States. The fact that some of the first law enforcement organizations were created out of the hunting down and re-enslavement of freed Black people in the country, the fact that early law enforcement was involved in the removal and genocide of indigenous peoples, I think even within poor communities and marginalized communities, immigrant communities, there is a tense and difficult relationship with law enforcement that has had a long history in the United States. You know, immigrant communities, regardless of European descent or not, have long been victims of law enforcement brutality. So I think we have a difficult relationship with law enforcement that needs to be really investigated and really better understood in order to move forward as a nation. I think it's so multifaceted and I understand why so many law enforcement agencies and police departments are, you know, I wouldn't say fighting back, but are certainly angry with calls for defunding them and things of that nature right now, because it feels like an attack on their livelihoods. It feels like an attack on their opportunities to move from working class communities into middle class communities. And that's understood, but I think there needs to be much deeper work on what that means and how the tactics, or lack of tactics, or implicit bias, and just understanding of authority and power plays into the police brutality that we've seen in the country, since the country was a country.

SM Do you think it's a problem with police forces themselves or with Americans at large?

CJ Problem is - is a difficult word. I think it is something very American. I don't necessarily think it's even simply police departments. I think this is a very American problem. As we talked about, when we talk about culture shock coming back to United States, this is a very American issue. The ideas of power authority, who that power and authority is invested in, concepts of violence, concepts of gun ownership, and who gets to have the privileges of - of both of those things. It's a very American cultural perspective that needs to be investigated. As with many countries throughout the world, you just didn't see - not that there wasn't any, certainly in Belgium and France, when - when engaging with Arab and immigrant communities there, the police were extremely brutal when dealing with African immigrant communities there. Police could be extremely brutal and continue to be extremely brutal. But I think that America has a very "special", I say that in air quotes, relationship and a very special intertwining of these issues that as - as Americans and as people living within the United States, we have to deal with.

SM Are you excited about what has been happening this summer as more and more people have joined together to fight for social justice? Are you optimistic?

CJ I would say I am optimistic in seeing a new generation of movement organizers and new - not even new demands, but new ways of making demands for full humanity and citizenship in this country. I'm very excited about the conversations that many of us are willing to have, regardless of the consequences. I'm very, very excited about that. I'm very fired up about that. I don't know if it will be enough. I don't know what will be enough. I think... Racism, I think - I think it's an original sin. I think it is baked into the system that is the United States. We would have to do some serious systemic and systematic restructuring in order to pull that out. I think, unfortunately, racism is one of the things that makes America, America. And I think it would take a lot more work. Do I think it will save black lives that Latinx lives, Trans lives, queer lives, women's lives? I don't know. I really don't know. I hope it does, I really, truly hope it does, but I don't know if it will.

SM Christie Jones is an undergraduate academic adviser and field experience coordinator at the George Mason University. Jimmy and Rosalynn Carter School for Peace and Conflict Resolution. This is With Good Reason. We'll be right back.

[00:28:03]

SM Welcome back to With Good Reason from Virginia Humanities. Most students are fascinated by science in elementary school, but -

AS We lose that and students lose that by the time they're in eighth grade, high school. Studies show that they've come to hate science and they're afraid of it. Oh, I don't do well in science and I can't do science.

SM And it's a vicious cycle. Students who are intimidated by science and go on to become elementary school teachers are often still insecure about teaching science.

AS Then we end up graduating students who have this - less understanding of how the world works scientifically. And they don't - they don't become active citizens of science in their - in their daily lives.

SM We'll talk about that in a moment. But first, Juan Garibay grew up in Wilmington, California, a polluted port city with oil refineries outside of Los Angeles. There, he saw firsthand how chemical pollutants decreased life expectancy and increased the likelihood of cancer among his family, friends and neighbors. Juan Garibay is now a professor at the University of Virginia's School of Education and Human Development. He's studying how STEM majors can advance social justice efforts to. Juan, you grew up in Wilmington, California, and you described it once as an industrial garbage can. Was - it still that way or just when you were growing up? What do you mean by that?

JG Yes, so Willmington, California sits at the south part of Los Angeles and it's adjacent to the port of Los Angeles and the port of Long Beach. And so those two ports make up one of the largest port complexes in the world. And so with that comes a lot of health issues because you have ships coming in from a lot of different parts of the world. For one to bring in pollution, but also bringing in animals and insects and that sort of thing. Those containers go on to different vehicles, to the rest of the nation. So pollution from trains, pollution from diesel trucks. You know, we sit out above a large oil well and so the community is literally surrounded by oil refineries. And then you have the freeways. And so you - you just have everything hitting this small community that's predominately Latinx, working class, largely immigrant. And so when I say, you know, industrial garbage can, it's literally because we were just hit with everything when it comes to industry.

SM When you were growing up, did you have any concept that these ports and refineries were degrading your communities, air and water and health?

JG So when I grew up, I suffered from a lot of nosebleeds, allergies, and was even on the brink of having asthma. And my sister and other younger cousins did grow up with asthma. And so, you know, going to the doctor's office, there were never questions from these medical professionals regarding like, where do you live? And making those connections between the environment and possibly what - what was happening to me healthwise. You know, a lot of it, I think, was what are you eating? Maybe, you know, connecting it more so to genetics rather than connecting it to the place we live.

SM So was it only after you'd gone to college and come back to the community that you realized what was really happening?

JG Yeah, I think - I think during college, you know, I started reading The L.A. Times a lot more. And when I'd look up articles online about my community, there are a lot of articles in relation to the environment. And so I started to really connect the dots there with respect to industry and the environment and some of the things that the community was facing.

SM I'm amazed that as a math student at UCLA with one of the best math departments in the country, you actually asked your professors in college if there was a way you could connect your math to social justice.

JG Yes.

SM How did you even think to ask such a question?

JG Well, I think in part it's, you know, where I grew up. You know, I was really passionate about mathematics. But when I was pursuing mentors in the math department, the question often came up like, what are you interested in and what would you research? And so those conversations around social justice inequality would occur then. And oftentimes pushback happened, and the encouragement to seek research opportunities or even majoring in a non-STEM major. But that guidance is untruthful, right? Because there actually is a lot of ways that you can pursue social justice goals through STEM.

SM It's interesting, isn't it? You know, because it would be a very popular inquiry if you ask it now, I think. Social justice and STEM.

JG Right. Right. And so you see - you see more of this being done at the K -12 level, making those connections more directly in the classroom. But in higher education you find a very different environment, where faculty are really connected to the discipline tradition in a traditional sense. And just the socialization that happens within those environments, I think it's much stronger, there is a much stronger pushback to even think about issues of inequality. And I'm sure a lot of these students are still facing it today, where the idea of STEM education and social justice is just too fetched for many. Many think that STEM should be, quote unquote "objective" where, you know, you kind of leave your identity at the door. But the reality is nobody does. Right. And so I think a lot of that is just trying to keep the status quo and not really opening up to recognizing how STEM is applied and that there's a long history of a lot of sciences that created and perpetuated racial and ethnic inequalities. And so I think in order to really move forward, STEM really needs to

recognize that history and change and acknowledge the need to connect STEM and social justice more directly.

SM What are some of the ways that STEM and the sciences have actually created those inequities?

JG So there is a lot of history around eugenics. Right. And how the authority of science created so much of racism. Right. After that, there were scientists who pushed back against those ideas and debunked them. Through that history in and of itself, you see these two ways that science can be used to create inequities, but also to to debunk some of those false narratives. And so just connecting the science and racism there. So scientific racism. And then there's also the - I should say, there's also through engineering where freeways, for example, get built. Right. So oftentimes they get built through particular communities that have less political power. How does that impact the well-being of those communities? Because freeways to bring a lot of pollution. And things like refineries. Right. So connecting industry, science, chemistry, as well as the impact that that can have. There's a lot of different ways that STEM in the past has created and perpetuate inequities. And even today, different forms, especially as you think about technology, thinking about, for example, drones and their use on the US-Mexico border, or even through militarization. So there's a lot there, it's just up to us to to recognize it.

SM And your big fight is mostly, let us train students who are majoring in STEM fields to be particularly aware of and sensitive to social justice issues. Let's give them such a grounding in these issues that as they go out and apply STEM in various ways, they'll have this as a backdrop.

JG Right. And so my work initially was finding that students who majored in STEM tended to not want to work for social justice as much as those who majored in non-STEM majors. What I was noticing is that students of color, in particular African-American and Black students, Latinx students and American Indian students, they still wanted to more so than their white peers. And so my work now is looking into, so what are some programs doing to try to increase that? We're finding that there are different types of experiences. That universities and STEM programs are providing for students to help try to increase their sense of social responsibility and wanting to make a difference in society. Some of those things are like student-led research projects, as well as particular types of courses that are - that are connecting issues of social inequality to STEM. Courses, for example, like in the biological sciences that connect pregnancy outcomes in American women, for example, you have this type of course, you know the connection to gender studies as well as biological sciences and health. You have courses such as coal in the heart of Appalachian life that connects the physical sciences to life in Appalachia, and some of the inequities that are faced there. As well as, for example, chemistry and ethnicity, there's a course on uranium and American Indians. A course, like that would examine issues of nuclear energy in reservations. It just connects the political, the social to the science. Right. And so you get a much deeper understanding of how science can impact society. You even have courses in mathematics that connect mathematical concepts to real world situations.

SM You're reminding me that during my college years, some of the most interesting humanities courses were in the engineering school. And you could see that they were trying to infuse an element of a rich kind of life beyond just the mechanisms of doing engineering work and training. And you're saying, let's extend that to social justice issues as we're bringing up this new generation.

JG Right. Right, exactly. For one, we're trying to diversify the STEM pipeline. We typically hear the purpose of a STEM degree is better, higher paying job, right. Many of these students are more so seeking to address issues of inequality with their - with their degrees. And so if we can change this aspect of STEM culture and STEM programs, you know, I hope that - that will help change the environment so that more students could be successful. And then second, you know, redefining that notion of success. Right. And rather than just learning the concepts, learning the concepts in STEM and the content, along with wanting to make a difference with those concepts and content and promoting the human good through STEM.

SM Are there any programs, our college departments that are doing this exceptionally well that you admire?

JG Yeah. Yes, there are. I would say that, you know, HPCUs and some HSIs are ahead of the game, are ahead of the curve here in the sense that you look at their mission statements for many of their programs and in their mission statements, it connects to issues of social justice to their purpose of educating future STEM professionals. What you see in more traditionally white institutions - you don't see that because a lot of the courses that are being developed at traditionally white institutions oftentimes are - are for non-majors, which is really interesting. But that is much more infused, I think, throughout the programs at historically Black colleges and universities. And some Hispanic serving institutions, HBCUs and HSIs tend to graduate some of the largest numbers of Black and Latinx students in the STEM programs, and so one thing we have to ask is - is why is that? What are they doing differently? And we're starting to see that there is more of a direct connection here and not just with, you know, in the curriculum, but also even the type of research that faculty are doing, the type of research that students are involved in. And so ultimately, that creates an environment of success.

SM Juan Garibay, thank you for taking the time to talk with me on With Good Reason.

JG Thank you so much. I truly appreciate it.

[00:42:28]

SM Juan Garibay is a professor at the University of Virginia School of Education and Human Development. Coming up next, how the power of water is transforming teachers and STEM majors. My next guest had been teaching biology for years when he realized that most elementary school teachers were terrified of it. Mark Fink decided to make it more interesting. He wanted to take a more hands-on approach, starting with the estuary in their own backyards. Now, as an associate professor of biology at Longwood University, Fink has made this class available to all majors. Mark, you have been taking students and future teachers to classes on the Chesapeake Bay and the Atlantic Ocean off Virginia. What gave you the idea that they can best learn science and STEM through the Chesapeake Bay?

MF Well, I have to go back about 15 years ago. I actually was teaching an introductory course in biology for future teachers. And I came to understand that they were not grasping the content very well and that they had this fear or this dislike for science. And so I began to think about teaching this course in a way that was more engaging. And so we would use topics important to contemporary society to drive the biological content.

SM Why did you care that the teachers really relished their biology course? Why not just let them get a passing grade?

MF Because studies show that that young people, young children are very excited about science. They're very curious about the world around them. And they're always asking questions about - about gross things in nature and animals and how things work. And I think that we lose that and students lose that by the time they're in eighth grade, high school - studies show that they come to hate science and they're afraid of it and they "oh, I don't do well in science and I can't do science", and then we end up graduating students who have this - less understanding of how the world works scientifically and don't become active citizens of science in their in their daily lives. And so, you know, my - this is my small way of maybe trying to change that cycle. Can we send teachers, future teachers into the workforce, the K - 8 classrooms who maybe have a little less fear of science or a better understanding of science and can continue to excite those students and keep them engaged in science and maybe some of them will become scientists?

SM And what sort of experiences do you give students on the bay to help sort of expose them to those complexities?

MF So we engage with people who make their living on the Chesapeake Bay, oystering or trapping blue crabs, or fishing. And that industry has changed a lot over the years as the bay has changed and they tell us remarkable stories about how the communities along the water have changed, as the fisheries have changed, as the bay has changed. And so you start to put these pieces together. You know, visiting an oyster shucking facility were mostly migrant workers, working these long shifts in an assembly line, shucking oyster after oyster after oyster for long hours, and then to hear the shucking manager describe how it was very difficult - it was becoming difficult to keep oyster shucking operations going just because of recent changes in immigration law. You know, we - we were hoping these students will be out on these experiences, can view these issues through multiple lenses, you know, and see how it's you have to have more than a scientific lens on to be able to begin to solve the problem of why are oysters declining, or how can we save a certain species, or how can we stop climate change. Right. So there's a political lens and an economic lens and a socio - sociological lens.

SM What is the most surprising thing to you over the years that you've learned about your students and their understanding of their own natural environment?

MF Well, I think some of the experiences that we've had on the bay with these students, just last October, we were out on Smith Island, which is a tiny little island in the middle of the Chesapeake Bay on the Maryland side. So when we docked on Smith Island, the island was largely flooded and we just got off the boat, on the flooded dock and we disembarked to water up over our knees, handing out luggage down from the boat. And I think the students thought we were probably insane at this point for making them get out the boat. I think some of them thought we were just going to turn around and go back and we were just trudged forward and made it to our bed and breakfast, which fortunately was up on dry land, barely on dry land, and we dried off. And as this excursion on Smith Island continued for two days, it was so fun to see the students start to relax and start to kind of see a little bit more around them and how the people who were - who lived on Smith Island, this was pretty normal and life went on. And even though the church was flooded and the grocery store was flooded and this was just the way things were and, oh, it's just an unusually high tide and it will go down. And to see their their reactions like that, these people live like this and to be confronted firsthand with with this kind of coastal erosion and

sea level rise, and to talk to the community people and understand that they won't refer to it as climate change or necessarily - or even sea level rise. But they do refer to change and that change is happening around them.

SM And would you say that that very visceral, almost frightening initially, connection with the water and understanding of sea rise actually was a powerful lesson in science for the students? Does that lead to them possibly engaging more intimately with a science career later?

MF I think it can. I think it can have that effect. And I think just the students themselves just talking about it and understanding that other people are going to explain things differently and maybe attribute different reasons to something that they might be able to see a little bit more through a scientific lens - I think it can have that personal effect of deepening one's appreciation for the power that science can have to change our lives.

SM One of your students last fall created an art project as a tribute to what they had learned on the Chesapeake Bay.

MF Oh, yeah. It was actually a group art project. And this project consisted of Polaroid photos. We give each student a Polaroid camera with a limited amount of black and white film. And during -while we were out on the Chesapeake Bay, they were asked to photograph very judiciously what they - what they figured it would be an important image that they could later document and talk about. And what is most meaningful to me, and I think really captures the course in a lot of ways, is - is the title of the piece. And the students ended up calling this art installation "Their Fate is Unknown". So while we were waiting for a ferry to go to Tangier Island, another island in the middle of Chesapeake Bay, and the ferry never came because Tangier Island was flooded until the ferry wasn't running. But we were standing at the ferry landing waiting for the ferry to arrive, looking at this Virginia historical marker. And the title of the marker was "Their Fate is Unknown". And the marker was about this Native American group who was taken to Tangier Island in their 60s, hundreds, I believe, by early colonists. And they were left there and abandoned. And so the marker was just describing how we just don't know what happened to them. And we were just looking at this marker for quite a while, waiting for the ferry and that title, Their Fate is Unknown, really stuck with us. And it stuck with the students. And they kept talking about it when we were traveling from site to site. And how it kind of really pertains to so much of their experience. It pertains to the oysters and the crabs and the watermen and the bay itself and really to all of us.

SM You're right. It really does apply to all of us, right?

MF Right.

SM Well, Mark Fink, thank you for talking with me on With Good Reason.

MF Oh, absolutely. And I very much enjoyed it. Thank you for having me.

SM Mark Fink is an associate professor of biology at Longwood University. Major support for With Good Reason is provided by the University of Virginia Health System. Pioneering treatments to save lives and preserve brain function for stroke patients. UVAHealth.com. With Good Reason is produced in Charlottesville by Virginia Humanities, which acknowledges the Monacan nation. The original people of the land and waters of our home in Charlottesville, Virginia. Their production team is Allison Quantz, Matt Darroch,

Lauren Francis and Jamal Millner. We had production support from Aiden Carroll. For the podcast go to withgoodreasonradio.org. I'm Sarah McConnell, thanks for listening.