FINAL TRANSCRIPT: Casey Ivanovich

VC: Hello, I'm Vanessa Corwin

KK: And I'm Kathleen Kaan

VC: The effects of climate change on our planet go far beyond the melting of polar ice caps. In big cities like New York, where we live, the record-breaking heat waves this summer have many harmful effects on all aspects of our lives. To help us understand what's happening, Casey Ivanov ich, a PhD student from Columbia Climate School in New York, joins us. Welcome to the podcast, Casey.

VC: Let us start from the causes of this extreme heat. You know, I have to say, I was watching the Olympics this morning from Paris and I was watching the beach volleyball players who were playing in 94-degree heat and humidity which means the temperature on the sand was like 100 degrees plus. And these guys were playing barefoot.

CI: So, in general, extreme heat can come by variety of different physical mechanisms and it really depends on where you are as to how those mechanisms drive these individual events. It tends to be associated in the US with high pressure systems moving in, if you can imagine when you're watching the Weather Channel, for example, you can see these Hs and Ls where the high pressure is moving in, so when one of those systems sits in an area for a given amount of time it increases the temperature in those locations. So, we tend to think of the effect of the urban heat island. We know that certain surfaces can influence the temperature in a given location. So, if you have a lot of asphalt, if you have a lack of trees and vegetation that provide cooling effects, you're going to see much higher temperatures in cities and the surrounding areas. But of course, we also know that climate change is playing an important role as we experience more frequent and intense extreme heat in the present and future climates. We have this extra intensity added to the system due to continued climate change.

KK: Does that mean that it's not going to get better, it's just going to get worse, it sounds like. Especially explain, you just mentioned about the heat island especially in the big cities with the asphalt. Can you talk about that a little?

CI: Sure, so in cities we tend to have a lot more built environment so we have a lot of asphalt, there's less grass cover, there's less trees and vegetation more broadly. The vegetation itself is doing this process called evapo-transpiration, which is evaporating water into the gas phase and so that has a net cooling effect. It's very similar to the cooling effect that we have in our bodies when we evaporate sweat off the surface of our skin. That has a net cooling impact

on the air temperature but asphalt and steel, these very dark impervious materials are also good at absorbing sunlight so they also tend to heat up a bit faster than those other materials. So, both of these are contributing to having higher temperatures in cities than very closely surrounding, more rural areas or even suburban areas. So, this influences the way that we kind of tackle these challenges in the city. We can plant more trees, we can increase vegetation cover, we can put green roofs on buildings, all to reduce the surface temperatures as well as using surface materials that are different colors, that are made of different materials that can reduce the amount of radiation that is really held on to.

VC: So, all this heat gets released at night, is that right? So that when the sun goes down it doesn't really cool off that much?

CI: That's definitely part of the challenge. That nighttime heating is a very essential part of the equation particularly for people's experience of heat stress. We know that if people don't get a respite from the heat overnight, they don't have their bodies cooled down, this is something that's very dangerous for peoples' experiences with heat stress.

VC: So how does it affect peoples' health?

CI: Based on the exposure you can experience heat exhaustion, or some difficulties doing the same amount of labor or exercise and that can escalate very dramatically into getting heat stroke, or experience life-threatening illness.

VC: And there are certain populations that are most vulnerable?

CI: Absolutely. So, this really depends on people's pre-existing conditions. This can differentiate by age. So, we know that older individuals have less effective sweating systems so this means that they can't cool their bodies down as efficiently. Older individuals also tend to take more medications which can increase their risk for heat stress. But also, people who have pre-existing health conditions or have sort of co-morbidities may be at greater risk for extreme heat. So that's something that really needs to be taken into account that the same amount of heat is not experienced equally in individuals.

KK: So I'll go to the effects that we are seeing with infrastructure and increased energy costs, we're obviously using more air in the evening.

CI: Yeah, so this is a really tricky issue in terms of the increase in energy demand associated with the need for more air conditioning and this is obviously placing a higher strain on the electricity grid. I certainly have lived in New York City in the summers when we get push notifications on our phone urging people to turn off their air conditioning in the hours when we really need it most. So, there's this really difficult relationship where the highest amount of energy strain on the grid is taking place in the highest temperatures and that's also when people need their air conditioning most just to keep themselves safe. There's a real risk for power outages when the entire city is trying to utilize these cooling mechanisms and that's a major challenge that we need to face in the future. But at the same time there's major issues with inequality in terms of access to air conditioning. There's a lot of air conditioning installation in a city but even people who do have air conditioning units installed whether it's a window unit or central air maybe aren't running their air conditioning because of the cost of utilities. So, these are major challenges in terms of the system we have at our disposal as well as behavioral challenges and making sure that people are really able to protect themselves.

VC: How about the effects on labor? Now I was reading that extreme heat is said to cost the US economy like about 100 billion dollars annually, projected to increase to 500 billion, so how does this happen?

CI: I think one of the major things, we already talked about this concept that people's individual health conditions can impact their risk for extreme heat and heat stress, but the livelihood that people have are also a major factor in terms of how they might be affected by extreme heat. So, when we think about the best ways that we can use to combat the effects of extreme heat during a heat wave, you would go inside, you would access air conditioning either in your home or maybe you would go to a cooling center if that is more available to you. You might go to the public library, you might go to the movie theater, somewhere where there's a large space with air conditioning access. But if you're someone who is outdoors, doing construction work, or agricultural production, for example, that's not necessarily an option and so you have to be outdoors, you oftentimes have to be in the sun. You can't even seek shade, in some circumstances. And further, people doing this type of work are also incentivized to push themselves as far as they can so they don't miss wages, so they don't' get penalized in some way from their employers. So, there are major challenges in terms of insuring that people doing outdoor labor during heat waves are really protected from all of these physical hazards but also just a system which really disincentivizes protecting oneself. One thing that has been suggested is shifting labor hours to earlier in the day, maybe the sun isn't as strong, maybe the heat hasn't picked up to its full capacity. But that is something that is very challenging to work into our existing systems as well as ensuring the safety for all of these people doing very important work.

KK: You know, you hit a little bit on it before earlier in the conversation about what can we do to reduce the effects of extreme heat. You mentioned planting more trees and the grass on the roofs. What research is being done that can actually tell the people what to do and is using alternate energy like solar, and electric cars, will that make a big difference?

CI: Yeah, so there's some really exciting work taking place to evaluate how effective these types of interventions are. Most of this work, to my knowledge, is taking place in laboratory settings so thinking about how changing what we call the albedo of a surface, that's essentially how much radiation is being reflected or absorbed, how those kinds of changes might influence the temperatures experienced on the ground or how planting a couple of trees might increase the evapo-transpiration and thus reduce the surface temperature. The exciting developments in this research field are really the case studies that can be done in a given location. So, say, in a place like New York City where we're really actively working to increase the amount of tree cover within the city, can we measure what the average temperatures are in the summertime and then as soon as we implement some of these changes, really get on the ground measurements of how that is translating to reductions in surface temperature. Could you repeat your second question?

KK: Tell us about the difference in using alternate energy sources, such as solar, and electric cars. Does that look like it's going to happen soon in the future?

CI: So, we're certainly moving towards incorporating more of these green energy sources into our systems and I think that this really touches on an important distinction between interventions that work to reduce emissions, so, sort of mitigation efforts and then interventions that work towards adaptation. For the last couple of years, we talked as if these were two sort of separate gains that we had to prioritize, but what we know is that they have to happen in tandem. So, while we're working to reduce the amount of emissions associated with all of these different industries including electricity production, we also have to work towards implementing these adaptation strategies that are really necessary, immediately. So, in the present we're already seeing the effects of climate change. This is true across the globe, particularly in New York City as well, so we really have to prioritize doing both of these at the same time.

KK: What can you tell our listeners, what can we do to raise the awareness of the harmful effects of extreme heat in our cities? I know that there's a lot of publicity around it but what other things we can do that is not being done?

CI: That's a great question. I think one of the biggest challenges with extreme heat as a climate hazard is it's not visible. We can see a hurricane, we can see a tornado, we can see flooding, and that's not the same for extreme heat. Even though it's the deadliest of all climate extremes both in the United States and the world more broadly, this is something that, it's very sneaky. I think one of the major challenges is that there's a huge behavioral component to protecting ourselves against extreme heat. Summers are hot in New York City, they are very muggy, we're used to that. But at the same time, we know that these events are changing. We can see it, we've seen it within our lifetimes and I think that is something that one, we need to start discussing a bit more openly how we're seeing things change, and how our behaviors need to change in response. But I think that one of the best things that we can do is really to check on one another. And that's a major challenge within a big city. We live in these apartment buildings, in some places it's a very transient city to some degree and so people don't always know their neighbors. People don't always know who needs to be checked up on, who is having a conversation with their family, someone is investigating whether or not they're OK. Another major vulnerability of older adults in this country is that they oftentimes don't have a social network that allows them to be safe. So, what we really need is to work more on building community in these essential high-risk times, making sure that the people around us have what they need, have access to air conditioning, have proper hydration and protect each other in these really difficult times.

KK: That's wonderful.

VC: That's excellent advice. I think just the very fact that we live in New York, we live in a city like New York where we don't often know our neighbors, I think that's so important.

CI: There are so many resources in the city. We know particularly in New York City there is a wide array of cooling centers that are available. So, they can go to the public libraries, they can go to movie theaters, there are also these individual cooling centers that are put in place for heat wave events. There's been some really awesome work, particularly done by WE ACT which is a local environmental justice group which has shown that people don't know about, that people don't know these cooling centers are available, they don't know when they are supposed to use them or they have major concerns about why they don't want to go during a heat wave event. So, I think really meeting people where they're at, listening to these valid concerns and trying to ameliorate so that people can utilize the systems that are already there and that could really provide essential benefits during these high-risk periods. They have some really great environmental justice work that's ongoing and they particularly have an extreme heat group that works all on these issues.

VC: And are there other than WE ACT, are there other websites, other organizations, that people might go to?

CI: That's a great question. I think it's always good to check in with any kind of city government web pages, they're very active in terms of posting when heat advisories are happening or heat warnings are happening and giving advice on what actions are necessary. I think that's also another moment where we need to meet people. I know that sometimes those warnings are very difficult to read. Before I got into this field especially, I didn't know what the difference was between advisory, between a warning and how the different actions would be necessary. There's definitely ongoing work in the social sciences to think about how we can better communicate this to people and make it very clear and I think that's a major area of continued work. I think there is also another major challenge is a behavioral aspect in terms of people self-identifying, particularly as high risk. There's been some interesting work that has come out recently showing that individuals are very unlikely to label themselves as a high-risk group for heat stress. And so, this could be due to age for example. There's been some interesting interviews where individuals will say, well, I know that elderly people tend to be higher risk for heat stress but I'm OK, because I'm healthy. I can totally empathize with that kind of feeling. I know my body, I feel fine, I know what to do and it'll be OK. So even though these are sort of physiologically defined risk factors it can be really difficult for individuals to recognize that maybe they are one of these high-risk groups. And so, I think that kind of communication work is also really important to improve upon and to be really gentle with people and making sure that they don't feel scared and they don't feel attacked in some way or have any of these negative connotations being in these groups but at the same time make sure that they know what they need to do to stay safe.

KK: You know, after hearing what you're saying I think we need to congratulate the local weatherman because they're on top of it all the time and they do tell people. I guess the hard part is, they have to inform. They can't say, you cannot go out if you're blah blah. But they do a great job.

CI: Yeah, it's definitely a hard balance.

VC: So, Casey, this has been really, really great. So informative. Thank you so much.

CI: Of course. Thank you for having me.

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