EPISODE 4 TRANSCRIPT - TIMON MCPHEARSON - FROM THE FIELD PODCAST

TIMON MCPHEARSON: Heatwaves cause more deaths than any other natural disaster. We tend to focus on the ones that have the largest impact on infrastructure. We tend to talk about, ok, Hurricane Harvey when it hit Houston, cause approximately 200bn dollars worth of damage. Hurricane Sandy when it hit NYC in 2012, caused about 90bn dollars damage, regionally. And so those are really massive impacts. But when you think about who's being affected every single year by heat waves that are slowly increasing, especially in our cities, which tend to be very hot compared to the rural countryside, that's where most people die.

PS: Welcome to From the Field, a podcast logging real life scientists and their efforts to improve the world one study at a time. I'm Priya Shelly. - Beat - PS: On this episode I speak with Timon McPherson.

TM: Hi my name is Timon McPherson, I'm an associate professor of Urban Ecology at the New School and I direct the Urban Systems Lab.

TM: My work and the work of the lab is motivated by the way in which climate is changing the planet at a large scale. And also I'm changing things at a small scale, meaning in our cities, in our neighborhoods, in our backyards.

When we look out 30 or 50 or 80 years into the future in that context, that seems very far away for most of us and yet in the way in which climate as a particular example is changing so fast. I'm quite concerned actually about where we are headed and 50, 60, a hundred years from now, with the current trajectories, which the kind of climate change that we are expecting and it's not just climate change, you know, it's changes in nitrogen cycles, changing biodiversity, the amount of species on the planet is plummeting. So it's not some far into the future idea to look at 2050, 2080 or 2100 and say hmm I wonder how the planet is going to be different, what we're going to have to deal with.

But as I brought this ecological view of the city into our work, we realized that what we're really talking about is the city as a system and that who's in the lab are planners, economists, designers, data visualization, experts of various kind of social scientists of all stripes.

PS: Implementing a multifaceted group is something Timon recognizes as a crucial time saver when it comes to innovative development. Timon's upbringing seems to have influenced this idea..

TM: I grew up in east central Indiana on the back acres of a small family farm. It's a very poor region, a poor family. Basically what we really had as a major benefit in our lives was this 20 acre woods. I'm behind the fishing cabin that I grew up in on a small pond that was a fishing pond and this is a very traditional way in the farming communities in the Midwest, which was when those were turned into farmland, essentially a grid of one mile by one mile squares of roads were put in and that cut into the farm fields. You'll keep the front 120 acres for farming and the back 40 for subsistence farming for the family.

Our family trips were to go camping in the smoky mountains. That was like the, great big trip. If and when we were able to do that. So that drove me to go to college and study environmental biology. Then from my undergraduate to pursue graduate studies in ecology and evolution and natural resources which was at Rutgers University in NJ. From there, I went to the American Museum of Natural History as a biodiversity scientist, then to Columbia university into my current position at the new school in downtown Manhattan now.

TM: Going back to my childhood, one of the observations I had over the years was how the runoff from the farm fields and the changing farm practices were bringing excess nutrients into the pond and slowly killing my family pond. We had major fish kills where all the fish in The entire pond would die and these are the things that I noticed sort of personally in my own quote, backyard, whether it's this kind of pollution from agricultural runoff or it's co2 pollution in the atmosphere, other things that humans are doing around the planet that are really disrupting the ability of our environments to function well and provide us with, in the case of my family pond, a nice place to go swimming and fishing, you know, really a source of recreation for the family.

That's fundamentally what it was about. And that's been completely damaged by lack of good management. So I feel it's important for us to be working on multiple fronts simultaneously as opposed to say one for 10 years and then another issue for an another 10 years, because we've just got so many issues to solve and I fundamentally believe that they're solvable and most of the time we have the tools that we need, but we need to be applying them simultaneously.

PS: The same idea of working on multiple issues at the same time is actually happening on an international level. In 2015, the 2030 Agenda for Sustainable Development came into effect at a United Nations Summit. The idea being that 17 various goals, like ending hunger, protecting our oceans and battling climate change, will be completed by the year 2030. It's a task that Timon takes seriously.

TM : The UN and almost all the countries around the world have signed onto this. The sustainable development goals have been set for 2030, which is a very ambitious target. I think we're going to struggle getting there. It's like wow, it's 2018, so we have 12 years to like solve poverty and climate change and biodiversity loss and you know, it's not to poke fun of it. That's exactly what we need to be doing. We need these targets so we know what we've got to do today and next year and the year after otherwise we're already off track. I think the sustainable development goals are critical and yet at the same time, we need to operationalize them in our own cities.

PS: To address the problem, first we have to understand it.

TM: Global warming essentially is the observation that the planet is on average warming up in terms of its surface temperature and actually many other temperatures like the average ocean temperature is warming consistently year after year. And it varies. It might increase a bit and it might decrease a bit. One the whole, if you look over the last 50 or a hundred years and actually much longer than that, we see this very consistent warming trend and it's at a global scale and it's the aggregation of a number of sensors that are measuring temperature at the surface of the land and the surface of the ocean all around the world. When you plot all of those on the same graph, you get this warming trend, it's getting warmer over time. So that's where the term global warming comes from and it's a reasonable term because that's what we're observing, a warming trend. On the other hand, What's actually happening on the planet is that warm is changing our climate and the fundamental way it changes climate is complex and it means that in any one place you might have a warming or cooling, you might have a much more extreme precipitation or you might have a much more extreme precipitation or drought. So it varies.

PS: What comes to mind when you think of climate change? Starving polar bears? Melting glaciers? While that's all true, there's a less visible consequence of climate change that we don't really hear about. And that's heatwaves in our cities.

TM: The reason I really focus on my work in cities is because when we think about the impact people and on infrastructure, cities are where the most infrastructure and the most people exist.

So even though there's only, you know, three percent of the planet of the land area that is in, that has been urbanized in a really direct way, you know, basically paved over with buildings, built on top of that houses the majority of the human population.

In a place like the US, it's eighty four percent of the population lives in that area. That's not just the majority. That's almost all of us.

In Africa and Asia, it's quickly becoming that , so they're transforming in terms of their urban development so fast, it's kind of mind boggling and so that concentration of people and resources and where will we feel the impacts of climate change the most are going to feel them in cities and probably even particular I'd say in coastal areas because coastal areas having a whole additional layer of climate change to worry about which is sea level rise and coastal storms and storm surge. And when you think about where the majority of people in cities live, the majority of the cities with the majority of people are in coastal cities.

….climate change is having enormous impact already on our planet.

PS: That's huge. Most of us live in a city, I live in a city. That's almost all of us on the planet using the roads, buildings, pipes, and wires structured within them. To help us understand why cities will be effected in this way, Timon suggests looking at a city as its own ecosystem.

TM: Interestingly, The way we think about cities, at least the way I think about it and then the colleagues that I work with is that cities are pretty complex entities actually. We can understand them in the way we might understand any system. So one I think real break through that really comes out of urban ecology is to understand the city as we would a pond or a forest and to study it that way only it has this additional layer of complexity which is this built up infrastructure that people manage and build and develop. We have this concentration of people

Because people have been part of ecosystems as long as people have been people. People have been managing and the influence, the reciprocal influence between people and nature has been there for Millennia. But in cities it's really fast paced, it's very concentrated. So when we think about something like climate change causing heat waves, we have to take it very seriously that, heat waves can cause damage over a very short period of time.

Most cities are what we call urban heat islands. It's because of all of that pavement and buildings that it captures heat and holds onto it and the way that the more suburb inexorably landscapes around cities don't have a s much pavement or as much building. So already, cities are hotter without any climate change. That's just the way we developed and I think one of the most important things we have to change is the way we developed cities so that we reduce the urban heat island.

And I'm not talking about climate change yet, this is just about the fact that cities are hot because of the way we built them. So when you have climate change on to that, that makes cities even hotter. When a heatwave happens, cities experience that heat very intensely and people in particular parts of the city experience it much hotter than others. So you can see on a hot summer day in new york city, you know 30 degrees Fahrenheit difference between some areas of the city and others, you know, the rooftops of buildings are extremely hot. The pavement is extremely hot in the middle of central park or prospect park in NYC it's, it can be 10, 14 degrees cooler than it might be just outside the park on the sidewalk.

PS: New Yorkers know what to do when it's hot and Sunny out. We walk on the shaded sides of the block to cool off or avoid heat emitting from public buses or subway grates. But even still, that's just a quick fix to an immediate problem.

TM: when you think about who's being affected every single year by heat waves that are slowly increasing, especially in our cities, which tend to be very hot compared to the rural countryside, that's where most people die.

We need to be protecting our people and protecting in particular, I'd say the people who tend to get hit every time and that's a subset of people that is the most vulnerable groups are the elderly, babies, low income and minority groups that tend to feel the impacts of heat waves or flood impacts or other impacts of climate change more than the rest of the population.

PS: It's even possible for these particular groups to be impacted at a greater level than others who live just blocks away.

TM: So some people who can afford to have air conditioning and some people who can't afford it don't and that heat then doesn't change for them It comes in, it gets very hot and it just stays that way. Generally what this means is that it's the heat index is 100 degrees or more for one or more days or it's 95 degrees, the heat index for two or more days. So the idea of a heatwave lasts, it's not OK, its as really hot between 10A-2P and then it's gone. It's that this heat sort of in to the city for a day or two. When they put temperature sensors inside people's homes, that temperature doesn't drop at night like it does outside because that heat is heat on by the building.

Essentially the installation in the building isn't thick enough to keep the heat out but it's just perfect enough to keep the heat in. It maintains that heat and that can even last when the heatwave is over. So people are experiencing very high heat over long periods of time and physiologically you have to allow your body to cool down. You can manage going out on the street for a few hours or even half a day but in the evening your body has got to have a recovery period. Otherwise that's where heat related stress, morbidity and mortality sets in.

PS: This isn't just something that Timon and the Urban Systems Lab have theorized. It's a reality brought to their attention from the people living it.

TM: I had an older gentleman in my office not too long ago who is on a fixed income. So you know, basically what that means at last in the united states is, you're basically living on social security, you have a very limited resources interns of what you can do with that.

He can't afford air conditioning because they can't afford the monthly bill. So even if I or some other good person was to give him an air conditioner, he wouldn't turn it on because he can't pay the bill. And that's the case for lots of people. He also fits into this most vulnerable group, the number one most vulnerable group of people who are likely to suffer from heat. Whether it's a heat related illness that takes him to the hospital or whether they literally die from it. We have on the order of 600 people die from heat wave and heat related deaths a year in NYC and that's just the baseline and that's what no one's even talking about.

So he comes to me and he literally says to me, I'm going to die in my apartment, like, oh my god, what, you know, what can I do? And they said, well you know it history, it really illustrates the complexity of solving these problems. I think why we have to deal with the underlying problem with our city cooler and we need to be providing them with air conditioning and helping pay his bills.

….So in this gentleman's case in particular, he was about 85 years old and he said, the problem is he said "look I've lived through a lot of this. I know what to do. The interior, my building is cool and if I can get some of that cooler air where there's no light penetration, and it's you know, coming up the stairwells from the basement, if I can crack my door and window just right, it will come through my apartment, reduce the temperature and I can sit near the door and feel a little bit cooler and yet the fire code requires the door being shut, so then he's fined by his landlord because his door is open, it's against fire code, so it has to be shut and the landlord's fining him because he's being fined by the city for breaking fire code.

PS: If this situation seems complicated to you, that's because it is. Not only do immediate issues, like non air-conditioned buildings, need to be addressed, but also the longer term issues, like figuring out how to lower the overall temperature in the city. and for that matter, the world.

TM: It just illustrates how we've got to deal with a lot of things simultaneously. We have to think about the way we govern the city. We have to think about the regulations and whether they need to be changed…..when we're thinking about climate change and its impacts on cities, it means we need to be thinking about how do we deal with heat waves and coastal flooding. All of these things are being driven by climate change and we've got to deal with them together. It's a combined problem that you can't really solve in a piecemeal way that's not a transformative change.

PS: One of the ways to make a change is to go back to our roots, literally.

TM: I think we are fundamentally, spiritually, emotionally, connected to nature. So when we're around it, we sort of naturally bond with it. One of my most serious concerns about where we are at a sort of planetary scale in terms of what the human enterprise is doing is that this retreat to some extent, this retreat from nature into cities, it's causes us to lose some of that connection and that ability to not only use nature as a toll and a resource for ourselves but to understand the value of it for maintaining the enterprise of humanity on the planet for really maintaining civilization.

With climate change, heatwaves are expected to increase. They're expected to increase in terms of their intensity, how long they last and how often they come in. NYC for example, depending on whether you take this sort of middle path approach or expect more business as usual in terms of our ability to mitigate the climate by 2050, we expect our heatwaves and that sort of upper scenario where we haven't really done that much to mitigate global climate to triple. Might triple in terms of the number of heatwaves and even by 2080. So we're looking at the potential for some catastrophic heat waves to effect in this case, just NYC, let alone other cities around the world. And in some recent work where we've modeled that with some of our colleagues at NASA, the 30 cities, 30 global cities around the world, every single one of them is projected to get hotter. There are not exceptions.

….We have to develop in a way that's much more connected to nature because even the most simple analysis shows you that when you have more nature outside the city, it's cooler than people are not experiencing heat in the same way. Integrating nature back into the city, I think is one of the most important ways that we can cool the city and not necessarily say just cool this building or that building, but cool the entire city to really take the bottom out of that heat by reducing the urban heat island impact itself.

PS: One option is to include spaces with green landscapes or water elements.

TM: This is something that we tend to talk about - green and blue infrastructure sort of being green and blue spaces into the city in a much much deeper way of a way that's much more

holistic and I also would say that is probably in terms of priorities targeted towards the areas that are on the one hand hottest and on the other hand where the most vulnerable people to heat, live.

Paris recently for example, has mandated that all new buildings are either have to have solar on top or a green roof because they're going to have to be dealing with the heat and energy problem and every new building should have something like that in our cities and yet that's still not transformative enough to really meet the challenge that we will be in our last 2030 and then 2050. I think that we have to think differently about the city itself. It's a three dimensional place and we need to be thinking three dimensionally about where nature can come in. Right now, it's very flat. Almost all of the nature and even what we tend to highlight as major advances in bringing nature into the city. Bring green infrastructure into the city is at the surface. It's down where you walk but if we're thinking about combating heat and not just heat absorbing air pollution, helping absorb stormwater which produces all the surface flooding which as a lot of health impacts, providing new spaces for recreation, putting it in places where people are most vulnerable or even not vulnerable they'd just like to have recreational areas. They don't have parks in certain neighborhoods.

PS: I started imagining how the city would look if it were fully integrated with nature. I pictured moss and vines growing on buildings and green throughways connecting to larger green spaces. A Utopia of sorts. And, it's actually kind of what Timon is proposing.

TM: ….Everything from green walls and roofs and thinking about a connected network where the nature outside the city can move in and through the city and so that we're connected to our rural landscape and I think this is really about reconnecting the urban and the rural and that is on the one hand, about how we think about cities and about how e thing about this traditional divide between the urban and the rural. On the other hand, it's about climate change adaptation and it's really about transforming the way we build and retrofit and design our cities so that we are really using the tools that we have in nature and integrating them in a hybrid way with our infrastructure. And to me this is rethinking the way we engineer our systems. This is rethinking the design and the way we design all the infrastructure that we provide in cities so that people can have the services that they expect there.

PS: That could mean cooling centers, greenery, and more. It sounds great and would make a positive impact on the City. But Timon shares that sometimes, even his smaller projects haven't always worked out . Like when he and his team at the Urban Systems Lab completed a tree planting project in New York City.

TM: In some neighborhoods, some people ripped the trees out. We were puzzled, you know, who doesn't want a tree? And yet if you go to talk to people, which you know, we don't always do, like we should go to talk to people and they say it's not history, it's that this is where kids play and the trees and the way they're playing soccer in the street because that's their playground. They don't have a park nearby. Some of these neighborhoods, the street is their yard. Trees also are where people throw their trash out to get picked up because they can lean it up there. So if you have a tree, other people are going to throw trash in front of your house. The trash attracts rats, so now you've got a rat magnet in front of your house. It really is a complex organism and it's evolving and there's so many parts by one account, there's 700 languages spoken in NYC, how do you communicate with all of those people? ……So the social side of this is extremely complex and as you know, in terms of adapting to climate change is probably the most important one is probably it, you know, I'm on the one hand, I'm sort of trying to drive the conversation forward about getting the city to make a serious investment in green roofs and I'm bringing nature in the city, but on the social side there is even more work to do, to think about your behavioral change and governance and justice issues.

it's a slow process but I also thing it's organic. I'm not really concerned about it as a whole. What I guess I'm most concerned about is that we're on that trajectory that, we actually choose to develop the policies and the plans and train our managers and train our designers to start thinking differently about the city that we want in the city that we want to build so that it is fundamentally transformed 30-40 years from now.

PS: And the way to do that is for scientists to start reaching out. Timon and his team are doing this through 3d modeling and putting a picture to the heatwaves.

TM: I think in general we're pretty bad at communicating what science knows. So communicating science is like that's a serious challenge, we've gotta figure this out. Scientists have figured out a lot of things and can even sort of evaluate how interventions or solutions or various practices that people might have or whether they'll have the impact we're looking for. That's where modeling comes in. Our ability to come, to take an intervention to model what that would look like and sort of project out is that going to do what we wanted it to do.

So let's say it's a green roof, how much will that green roof cool the building and how many green roofs do we need to cool the city? This is a question we're trying to answer right now. It would be nice to know and I think it's something that we can tell the city is if you invested this amount of money and you retrofitted this many roofs and you would have this total amount of green infrastructure on those roofs as green roofs and that would deliver this amount of cooling.

One study about a decade ago from Cynthia Rosezweig's team at nasa did that kind of estimate then and said well, we could probably cool the city about almost one degree celsius. If we turned 50 percent of our roofs green. It sounds somewhat like a small number but its like climate change. One degree celsius is a massive change in temperature for climate change. That's seriously cooling.

Now we've really started to chop off the top of the urban heat island and make that city cooler. So communicating that science, so in a way that we can make better decisions, whether that's in city planning office or in the mayor's office or whether that's for a local non profit that's doing community organizing about how they want to change their neighborhood. Either way we need to help communicate that science and make it available and we need to also make it more visual. It's important for us to think about how we visualize both the information that we have and the kind of analyses that we can do. So that's something we've been doing in the urban systems lab is to build a model of the city where we can help answer some of these questions.

PS: Scientists have their work cut out for them, but so do we. Timon believes involving ourselves with our community will help brace us for the coming years and our battle against climate change in our cities.

TM: Cities are actually where the action is. I think we need to speed it up and we need to be more transformative. So this is where people can get involved. I think the simplest thing is find a local community organization and go volunteer. There's just amazing organizations that are doing amazing work locally in their neighborhood, connected to people they know who need help. They know where the opportunities are in a way that at the larger scale, we're trying to figure that out, but they already know. This is a way that you can plug in, whether it's helping to establish a community garden in the neighborhood and provide a resource not just for food and nutrition but for people to meet up and form relationships.

And that forming relationships is critical to weathering storms. The thing that we learned from Chicago heat wave and from the European heat wave and from the black outs in NYC and hurricane sandy that hit was that it's about people's connections that allow them to get through

this. So that coping capacity has to do about your social network. What people can do is really think about how do you build the capacity for coping with extreme events in. Your neighborhood where you can plug in what organization can even be involved in? And there's particular actions that you can do where you can help cool your city. Figure out how to start planting, or greening up your building, talk to your landlord about what you can do on the rooftop or in your backyard. I think that's the starting point for climate action is plugging into your community, make being an active member and finding a role that suits your interests and your passion but that has a benefit beyond you to the neighborhood.