

Government's Future Frontiers Podcast
How government and innovators are building community resilience in the face of climate change
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Today's guests:

Michael Flynn, Global Infrastructure, Transport and Regional Government lead for Deloitte Ireland

Jamie Sawchuk, national leader for Government and Public Services Alliances and Ecosystems for Deloitte Canada

Carolyn Murnaghan, national leader for Climate Adaptation and Resilience for Deloitte Canada

Christina Crue, emergency manager and advisory principal for Deloitte & Touche LLP

Justin Dawe, founder and CEO of Earth Force Technologies

Press conference: Milton is now a hurricane. So it's strengthened. It's going to start picking up the pace as it comes closer to Florida before it makes landfall. The entire Florida peninsula on the Gulf side has the potential to have major impacts from storm surge.

Tanya Ott: Extreme weather events are increasing—both in number and severity. That means more hurricanes, typhoons, and cyclones ...

Press conference: Right now it looks like Sarasota County had the most significant storm surge, likely somewhere between eight to 10 feet. And first responders have been working all through the night to help people who were in distress. And what we can say is the storm was significant, but thankfully, this was not the worst case scenario.

Martin Poyntz-Roberts: I was in Australia in 2010 [or] 2011. I was due to head back to stay at my friend's house in Brisbane. We knew there was a storm on its way—a big cyclone [was] coming. [...] There was footage on the big screens around the city of roads and cars being washed away. Big warning saying do not go to Brisbane. It's being cut off. And guess where I was going. The next few hours we saw the waters rise, the local stadium where just a few weeks ago a big rock band had been playing was underwater. There was a fire there because the water was short of the electrics and caused the fire. Basically a lot of the CBD [Central Business District] of Brisbane was underwater.

Ott: More floods.

Jamie Sawchuk: I live in British Columbia, and over the weekend we had something called an atmospheric river: Essentially a massive amount of rain comes down in a really short time, hits the Rocky Mountains, and you almost get a tsunami effect coming downhill. A couple of years ago, an atmospheric river wiped out all the roads and railway lines to Vancouver.¹ Vancouver was essentially cut off from the rest of North America. It was pretty surreal.

Poyntz-Roberts: Everyone had emptied their houses of, of all the stuff that had been damaged by water. There were things like mattresses, beds, tables, chairs, TVs, the works all on everyone's lawn. You can see on the walls outside the house is just how high the water would come. It would come at least the top of the first floor.

Ott: More heat.

Bushfire testimony: I turned around and I saw a 10-story fireball, like, literally, I don't know, maybe less than 100 meters away. There was white smoke billowing, but flames shooting out the top of it, though the trees were crowning. I just automatically went into flight/fight mode and basically headed out the front door to go down that gully to the beach. Flames were rushing up that gully from the beach. It was unbelievable. I had to try and make my way through the bush and run down another way, which I'd never imagined.

Ott: More fire.

Press conference: In the last day or so, we have all seen on the news and social media the horrific pictures and videos coming out of Jasper. Homes and businesses have been lost to a wildfire that people are calling a wall of flames. Right now, the wildfire is still out of control and crews are working in dangerous conditions to try and protect critical infrastructure in the town. To the brave men and women currently on the ground in Jasper. I want to express my deep gratitude and the gratitude of all Albertans.

Justin Dawe: And it was in the summer of 2020, which was again, one of these bad fire years. And my family and I drove from the Pacific Northwest all the way back down to the Bay Area, and we were under smoke the entire drive, [the whole] 600 miles. And part of that smoke was coming from a very dear family friend's house burning down, among millions of acres burning.

Ott: And these events are likely to get worse.

Sawchuk: Well, we live in a time when the world's getting hotter. Last year was the hottest year on record.² July was the hottest month in recorded history.³

Ott: At least it was until August, which, according to the National Oceanic and Atmospheric Administration, set a new record.⁴

Sawchuk: Climate change is causing our climate to react differently.⁵ We're seeing record wildfires, devastating floods, and amazingly strong hurricanes that are devastating parts of our world.

Ott: The costs of these events are devastating. A study in the journal Nature Communication found almost 61,000 deaths could be linked to climate change-driven weather events between 2000 and 2019. The economic cost of these events amounted to US\$143 billion per year. That amounts to US\$391 million per day. US\$16 million per hour.⁶

By 2050, the researchers estimate that the global cost of damage related to climate change could be US\$1.7 trillion per year. And that's the conservative estimate. In the worst-case scenario, those costs will reach US\$3.1 trillion per year.⁷

Those weather events, those costs, are going to keep building. And that is changing the way society builds—both literally and figuratively.

Today on Government's Future Frontiers, we're talking about building resilience in the face of extreme weather brought on by climate change. We're looking at the strategies that are being put into place to support resilient communities, and the technology that is helping to track, respond to, and mitigate these climate-driven disasters.

I'm joined by several guides to help us get a handle on this issue. Some of them you've already heard from. For example:

Sawchuk: I'm Jamie Sawchuk. I'm a partner in Deloitte Canada. In terms of my professional role, I'm working with clients to mitigate climate change, catalyze energy transition, and create sustainable communities.

We also heard from Martin Poyntz-Roberts ...

Poyntz-Roberts: I'm a journalist and the producer on this podcast.

Ott: And Justin Dawe ...

Dawe: I'm the founder and CEO of Earth Force. Earth Force Technologies, more formally. Yeah. There you go.

Ott: We'll be hearing more from Justin soon. Also joining us:

Michael Flynn: Hi. [I'm] Michael Flynn. I'm the Global Infrastructure, Transport, and Regional Government lead for Deloitte Ireland. And I also lead our sustainability business for our Public Sector practice.

Carolyn Murnaghan: Caroline Murnaghan, national leader for Climate Adaptation and Resilience for Deloitte Canada.

Christina Crue: My name is Christina Crue. I'm a certified emergency manager and I have spent my entire career in the emergency management field here for Deloitte.

Ott: So, as you can tell, we have a full house, and lots to cover!

But before we dig in, Michael Flynn has a reminder for us.

Michael Flynn: We've always had natural disasters, and they can be significant, and they can be tragic, but they have always impacted the world over history.

Ott: But individual events aren't the issue.

Flynn: The challenge with climate change and the impact of climate change is that these are happening more often. They're happening over longer periods of time where there's a season—and they're having a wider-scale impact. Because they're happening more often, it's harder to manage them on an individual basis. It's just a constant, and has multiple impacts.

Ott: That means our context for extreme weather events is changing.

Murnaghan: If we look over the last 50 years and you plot on a graph the frequency and severity of extreme weather events, you do see a very clear uptick in the pattern.

Ott: That's Carolyn Murnaghan ...

Murnaghan: My background is in the insurance sector. We can see [this] very, very clearly in the data the tracks catastrophic events. A 100-year storm on some curves has now moved to being a 1-in-50-years event. And those 1-in-10-years events ...

Ott: ... meaning a flood, a drought, a storm, [or any other] extreme weather events ...

Murnaghan: ... are happening almost annually. So we are seeing in specific instances that the likelihood of events happening is changing quite dramatically.

Ott: Those sorts of figures can be startling. But Michael Flynn reminds us that the new normal can become, well, normal. And when it does, communities and even whole countries can take the steps they need to mitigate potential harms. Take Japan, for example. The country sits on the edge of the Ring of Fire, a geological area rife with volcanos and prone to earthquakes and tsunamis. So city planners and builders and preparedness experts in Japan take earthquakes into account.

Flynn: They knew what they had to build to deal with at least minor quakes over a period. Their buildings are designed [so] there is movement [so] they don't come crashing down when earthquakes happen.

Earthquakes happen regularly that none of us hear about because it's just a rumble and they go on with their daily business. They know what to do. They know the reaction. They know the buildings are able to deal with it and life goes on.

There have been events in Japan over time that the built environment wasn't able to deal with it. It's not that you can get rid of the problem. What you can [do is] build into how you plan, design, and deliver your built environment to address at least some of the events that are becoming more frequent.

Ott: That building, that planning, that preparation—all feed into the concept of resilience. That's something you may have heard a lot about lately, but it can be surprising hard to pin down.

Crue: My colleagues and I have a great debate on what resilience really is because it's relatively new to the [emergency management] vernacular.

Ott: That's Christina Crue, who has spent her career in emergency management.

Crue: While [emergency managers] might think of resilience as this ability to bounce back, utilizing resilience in terms of ecosystems and people is relatively new—like 50 years in the making. And so because of that and because of the increased usage of the word “resilience” over the last 10 to 20 years, there's a little uncertainty of when resilience stops and, and when it starts.

But for me, I see resilience as an ecosystem, an interdependent network of people, of communities, of the economy that help us maintain our quality of life. And as you can imagine, that ecosystem or those interdependencies connected together, once one of those breaks or bends, it can impact the rest.

When you have stressors on any one of those core components—the people, the natural environment, the built environment, and the economy—the rest can slip as well. And I think that's what community leaders—prior to those natural hazards impacting those communities—really need to double down on: how [leaders] can strengthen that infrastructure and provide a more notable backstop for when [there are] impacts in those communities.

Ott: So on the one hand, resilience is about being able to deploy solutions quickly to areas that have been hit. One example of this is how emergency managers can help restore power to stricken areas.

Crue: A program in particular in which a micro grid was established to help provide that needed redundancy when it came to critical infrastructure and critical community services in and around that area. Those, as well as generators or solar power for specific community-based organizations providing specific needs to a community after a disaster, are ways in which they are bolstering current infrastructure as well as creating net new infrastructure to support community needs.

Ott: And on the other, it may mean knowing the financial circumstances of the community at large. For example, a recent survey by SecureSave found that 63% of American workers could not handle a \$500 emergency expense in times of crisis.⁸

Crue: There's only so much that an emergency manager or a community-based organizer can do to help limit those vulnerabilities. But knowing that you have your pockets of your population and how much would not be able to access that money, providing outreach and coordination on how to stockpile food and water in case of a sheltering initiative, or [linking] those communities with community-based organizations that you can then empower to help alleviate some of that burden in that time of shock, whatever that might be, is where [the industry is] leaning at this point.

Ott: The Federal Emergency Management Agency, or FEMA, recently released guidance on how communities can increase their resilience. They have also implemented policy changes that bring planning to the forefront.

Crue: A unique change in how our nation responds and recovers and mitigates from disasters happened a few years ago. And that's the Disaster Recovery Reform Act, and that act aligned 6% of post-disaster grants to the next year's pre-disaster, pre-mitigation funding that would be made available for those communities.

So instead of having this cycle of loss and then rebuild, it was loss, rebuild, and then intentional setting aside of additional dollars to help mitigate where those vulnerabilities are to begin with. And I think that is a powerful change, that link between policy funding and coordination, that has all the right chemistry to make notable change.

Ott: That advanced planning is critical in the face of the increasing number and cadence of natural disasters communities around the world are likely to experience.

Flynn: Sometimes, the solution is quite significant—protections [built] in the sea or even moving parts of cities to higher ground to take it out of that susceptible areas.

Ott: Michael Flynn ...

Flynn: That takes time, and it takes effort, and it takes a big mindset change from city or wider government. But it is about managing those.

Ott: The good news is, those built-environment solutions can be effective for decades, or even centuries. Take, for example, Winnipeg, Canada, where Jamie Sawchuk grew up.

Sawchuk: Years ago, we had a massive flood, lots of snow in the winter on super flat prairies. The river that runs through Winnipeg essentially became 40 kilometers wide. It wiped out some of the smaller communities upstream, like Grand Forks, and it was coming for Winnipeg. We were saved because of the infrastructure investments made in the [1950s], essentially a massive dike around that Winnipeg called the Winnipeg Floodway.

And then, when I think about water, I think about the Netherlands. I had the fortune to live in Rotterdam for a while, and I was blown away by the ingenuity of the Dutch. Here's a flat part of Europe, and they've been incredibly ingenious at managing how they coexist with the North Sea in a way that creates sustainable communities. And that's easy to say, that's crazy hard to do.

Ott: Massive infrastructure projects and changes to zoning and building codes are major tools in the arsenal of resilience. But these interventions take a long time to implement. Newer plans take advantage of the rafts of data now available, and the new technology that helps us use that data most effectively. Remember Justin Dawe?

Dawe: I'm the founder and CEO of Earth Force. Earth Force Technologies.

Ott: Dawe has been involved in the field of sustainability for a long time.

Dawe: I've been doing climate work for over 20 years. And despite being a middle-aged guy in suburban California right now, my secret identity is I grew up in a one-room house on the North Shore of the Big Island of Hawaii. And my backyard was a

coral-like lagoon with shiny fish and turtles and six-foot manta rays and all of that kind of thing. I've always wanted to work on sustainability, and I've been doing it, thankfully for over 20 years. And I feel very fortunate to have gotten to build a career in this.

After spending 15 years in renewable energy and then five years in electric mobility, I was looking at what's the next piece of the puzzle.

Ott: That piece clicked into place during the fires of 2020.

Dawe: And I just said, you know what? I think this is an entry point. I think that if we're going to take better care of nature, we need a charismatic enough problem that's high enough economic value that people are going to be willing and able to spend money on this. And wildfire is that entry point for taking better care of nature.

My co-founder and I, we met at a group that was called No Silver Bullet. Basically the notion of this group is you want to work in climate, but let's all recognize that there's no silver bullet. There's not one magic solution that's going to take care of this. We're dealing with a very complicated problem that touches [the entirety] of society.

Where we felt that we could fit in was to bring some resources and capabilities [and] creativity and innovation of private enterprise. And in particular, what we saw is that there are sort of technological pieces out there like cameras and computation and GPUs [graphic processing units] that help bring information to bear and help people understand the work that needs to be done and that those could be utilized.

Ott: That's where Earth Force was born.

Dawe: We're using what's called Lidar.

Ott: That stands for "light detection and ranging," and it's a method of mapping areas with dense vegetation.

Dawe: We're using GPUs, we're using high-quality cameras, we're using [AI] chips, and out in the woods, we are basically reading the forest in real time. We're doing that so that we can provide the guidance system to people who need to do this fuel reduction.

Ott: Traditionally, identifying what to cut has been labor-intensive.

Dawe: You have to bring in a bunch of trained forestry personnel to go use government-issued blue spray paint to mark which trees to cut or not cut. To pick my home state here, California has the labor force to do that type of preparation for, it's hard to say exactly, but around maybe 10,000 acres a year. The state's goal is to do about a million acres a year of fuel reduction.

Ott: And that's a huge gap. But using lidar to map vegetation allows the information to be sent directly to the people who need it.

Dawe: So that the people who are driving the 40-ton machines know what to cut or what to not cut.

Ott: Jamie Sawchuk says the California wildfires of 2019 marked a turning point in the use of this and other technology.

Sawchuk: Innovators in California began using AI, drones, satellites, and lidar. Today, they're using that at scale. Now they're mitigating 85% of their wildfires before they occur. And they're driving operational efficiencies of 10% to 50% into their operations.

I think we're familiar with our all of our cameras. Take pictures and videos right? Then on a drone, you put a camera. So a drone takes a picture or video, and then lidar, essentially, it's taking a fancy picture, but from a plane. And then, you have satellites taking pictures and images and infrared images, and using different sensors to sense different things that are happening in the earth. These are different types of technologies, creating unstructured data that you then need to interpret. But when you start to use the drone data, you can then frame the satellite data on what it's seen. Drones can be accurate within six inches. Satellites can be accurate within to one to two meters.

The innovators are now getting down to exactly where is the tree leaning? What type of tree is leaning? What are the soil conditions under that tree? How drought-prone or moisture-prone is the soil beneath it, and how probabilistically likely is it to fall over? When you take all that, you make sense of it, all of a sudden, you can get in front, instead of just clearing back the

trees once every five years, you go back and clear the trees that are growing super fast, maybe every year, or you take out some types of trees that are growing too fast and too close to the line, so instead of just cutting it back, you take it out. And this way, you structurally get ahead of the risk.

Ott: Another technology solution employed in pursuit of resilience is the digital twin. Michael Flynn explains.

Flynn: Things like digital twins are being used to model the impact of any of these events hitting a particular area. As you [are] looking at the prevention piece, [use] that digital twin to say, well, could I move? What do I need to do if I move this half of the city from the low-lying area to the high-lying area? [The digital twin] helps you in getting there a lot quicker and helps you make decisions. [It] can also look at the implications for my people point of view and it's going to look at the infrastructure elements of us.

You need lots of data to feed this properly. But, in general, in cities, we know that data. If you have that traffic or the weather data, if you have the city views, or you know the various locations views and you know what's likely to [be impacted], you can monitor what's already there, then simulate the potential issues in a given area. It's an iterative process using AI.

It's not going to solve everything, but it can start helping humans to say, look, if [a] forest fire were to [happen], here's where there are danger points. We've used the drone data, mapping all of those areas, and it's able to deal with far more data than humans and get to that answer quicker. But we [humans have to] point that out there in the right direction. We need to make sure we have applications of AI that are useful and pointed at this problem.

Ott: Both new technology and tested infrastructure have a role in building resilience as extreme weather events continue to rise. But there's a sticking point.

Flynn: The challenge is around how do you pay for this? Because it is expensive. Is it the homeowner or is it the government? People like insurers—should they get involved in planning?

Ott: That issue of who pays, and how to pay, is changing. Carolyn Murnaghan says that the insurance industry is taking a hard look at resilience.

Murnaghan: The purpose of insurance is to pool risks together to enable payment of claims when they come due. With insurers experiencing more and more claims, the size of that pool needs to get bigger. The source of the funds for that pool are often the premiums paid for the insurance.

If we look at it from a pure product perspective, it's likely that the increasing frequency and severity of extreme weather events driving higher insurance claims will over time increase the premiums that insurers are charging. We then have the kind of economic reality that oftentimes there's not in people's budgets a lot more money to go to paying for insurance premiums, and that may result in individuals having to change the insurance coverage that they have and potentially holding slightly more of the risk than they either would want to have carry or that they kind of lose some of the coverage that they might want, just because it is out of their affordability when they are buying their insurance. So, we do see that there are quite a lot of impacts from extreme weather in terms of what it means for the availability and affordability of insurance.

It may also happen that over time some of the areas that have recurrent events, it becomes more and more difficult for insurance companies to offer insurance to those individuals because of the perceived risk at that location. So, there are quite a lot of impacts in the product when we look forward and project kind of increasingly severe extreme weather events.

In terms of the encouragement to have more resilience at the property, we are observing across the OECD [Organization for Economic Co-operation and Development] a huge number of programs, both sponsored by private insurers and sponsored by government, to support individuals in increasing the resiliency of their property to multiple extreme weather perils. So that could be against flood, that could be against wildfire, that could be against hail. And these programs take lots of different shapes and forms.

There may be some activities around getting a sump pump installed, which would reduce the potential for damage to a home should there be a flood that impacts a basement. There may be programs around changing the roof materials once a hail event has taken place. This will reduce the amount of impact that a future hail event will happen, in particular, in those geolocations that are significantly impacted by that type of event. So we are seeing more and more programs come out that are encouraging individual homeowners to improve the resiliency of their property.

Ott: Other sectors of the financial services industry are also taking notice.

Murnaghan: For example, a mortgage—there is a lot more investigation on behalf of the financial services institution in understanding what mitigations there are for that property being damaged due to extreme weather events. We do see mortgage holders, oftentimes banks, becoming more interested in the property insurance that is available at that location and getting a little bit more into the detail of what the coverage is and what that would mean for the value of the collateral that is securing that mortgage. What would be the potential coverage should an event happen? Will it restore the value of the property?

When we look at higher or extreme risk properties, we are observing across the OECD that it is often the government who is beginning to step in to provide insurance coverage in those areas because they've gotten to the point where they are potentially not economic for the insurance sector to be covering. We have seen multiple OECD countries have their government step in with different types of products to enable insurance for those properties in high and extreme risk zones.

Ott: Which gives government even more incentive to mitigate potential disasters.

Sawchuk: Traditionally, you buy insurance for something that might happen once every 30 years. But when it's happening once every other year, once every five years, we need to respond differently. We need to build differently. We need to plan differently. So we're getting ahead of the risk versus just responding to the risk. And I think that's foundational. We need to mitigate the risk versus just buy insurance against it.

Ott: Again, these investments can be costly. In the past, in many places, investing in resilience and sustainability may have been seen as contrary to economic growth. But that may be changing.

Sawchuk: [Deloitte Global] recently surveyed 2,100 [C-suite executives], and on this concept, over 85% believe in increasing their investment in sustainability and in over 90% believe that we can achieve both our sustainability objectives and grow for the future.⁹ And that's really important. It's really important that we focus on both objectives. They're both normal versus creating this false sense that we have to pick between saving the planet or putting food on the table for our children.

Ott: What's more, the costs of not investing in resilience and mitigation strategies is becoming evident. Take wildfires. The Food and Agriculture Organization of the United Nations pegged the value of the global forestry sector at US\$600 billion.¹⁰ Well, Justin Dawe has a wake-up call for us.

Dawe: Wildfire[s] are estimated by the Congressional Budget Office to be costing the United States somewhere between US\$400 billion and US\$900 billion per year in economic losses.¹¹ So just let's take the midpoint like US\$600 or US\$700 billion. The economic loss from wildfire in just the United States is a larger number than the entire global wood-products industry.

Ott: Plus, wildfires pump more emissions and greenhouse gases into the atmosphere.

Dawe: The thing to bear in mind is that not all carbon is created equal. A ton of emissions that comes from a power plant or your car or something like that, people think of it all as having some impact. But if the ton of carbon comes from your house burning down, it's a very different thing.

Ott: As these extreme weather events become more prevalent, and their effects more widespread, the calls for increasing resilience will rise.

Flynn: It takes the village, because you need government and citizens to agree this is the right thing to do. Natural disasters generally [have an] impact on the citizens and on their real estate—but not everybody's. But everybody has to accept that this is something that's affecting an area, and therefore should be addressed.

Generally, citizens are saying climate change is here, it's an issue. We want our government to look at sustainability. We want to look at addressing these climate issues. So, therefore, you have been given permission from a governmental point of view to refocus money on sustainable points, including resilience. Now then you have to say, well, which solutions do I put in place?

Ott: So what comes next? I'll give Jamie Sawchuk the last word.

Sawchuk: There's a saying that change is slower than we planned for tomorrow or next year. But when we look back over 10 years we go, Wow! A lot has changed. And so I'm hopeful. I think change is very real, and our challenges are very real. But I also see innovators doing amazing things. I see those innovators mitigating climate risks, reducing wildfires risks by 85% being a

great example. I see them catalyzing the energy transition, creating resilient communities and driving sustainable growth. I'm very positive about the future. But we need to collectively take action.

Ott: Thanks so much for joining us today on Government's Future Frontiers. A huge thanks to all of our participants in this episode: Michael Flynn, the global Infrastructure, Transport, and Regional Government lead, who is based out of Deloitte Ireland; Jamie Sawchuk, national leader for Government and Public Services Alliances and Ecosystems for Deloitte Canada; Caroline Murnaghan, national leader for Climate Adaptation and Resilience for Deloitte Canada; Christina Crue, an advisory principal with Deloitte & Touche LLP; and Justin Dawe, founder and CEO of Earth Force Technologies.

Next episode, we'll be talking about future-ready cities. Smart cities could become even smarter with increased application of AI, both in infrastructure development and in analysis of data. New technology promises to enhance safety, sustainability, quality of life and resident experience—but also opens up risks to privacy and infrastructure security.

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