Transcript of ‘Tracking Climate Change and the Weather’

Season 3, Episode 10, Transforming Tomorrow

[Theme music]

Paul: Hello and welcome to Transforming Tomorrow from the Pentland Centre for Sustainability in Business. I'm Paul Turner.

Jan: And I'm Professor Jan Bebbington.

Paul: The way we measure the weather hasn't changed in over 70 years, and it's that consistency that has provided us with such a robust assessment of our changing climate.

So what can one single 50-year-old station on a hill in Lancashire tell us about our future on Earth?

[Theme music]

Paul: What's the weather like today, Jan?

Jan: I don't know, 'cause I'm inside a podcast studio, so I have no idea.

Paul: And we won't let you out.

Jan: [laughing] Yes…

Paul: …this is it. You're stuck here now forever.

Jan: It's true. That's true. But when I check, I use, uh, Norwegian Weather Service. That's my, my favourite weather service.

Paul: Ah yes, the Norwegian Weather Service, renowned for their forecasts for Lancaster and surrounding districts.

Jan: [laughs] Oh, but everyone's picking up data from everywhere and sort of re-presenting it. And we like the Norwegians 'cause they're quite good on mountain forecasts, but also they're quite gloomy, so it's usually better than [laughing] what they've offered you for the day. I can't have optimism in my weather forecast.

Paul: You, you are all for a pessimistic weather forecast that says there's gonna be six hurricanes, a few blizzards, and possibly at night, a frost.

Jan: Yeah, something like that. Anyway, it's, um, but I, I keep an eye on, uh, what the weather's like in mid -Canterbury in New Zealand so that I know how cold my sister is or how warm she is at the other time of year.

And then I'm off to Kuala Lumpur in just over a week or so. So I'm starting to track the weather there. So I am, I'm kind of obsessed by the weather. I love it.

Paul: Well, you fit in well in this country, [Jan laughs] because as a nation we are obsessed with the weather. Possibly due to the fact there's so many sort of mini-climates around everywhere seems to have its own different type of weather. Being up in Cumbria near the Lake District…

Jan: …yeah…

Paul: …every valley sometimes seems to have its own weather forecast. You can be on top of a hill in sunshine, go down into the valley and you can't see an inch in front of you because of fog, go up the next hill and you're being hailed on, [Jan laughs] and then go down the next valley and it's sunny again. It's…

Jan: … well, as I say, if you don't like the weather hang about, it's gonna change.

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Paul: It is, it is. Certainly. And the reason we're discussing this is because today we're joined by someone who is an expert on the weather around Lancaster.

Jan: Excellent. Tell me more.

Paul: Yes, we've got Dr. James Heath with us, and he's a Fieldwork Support Technician in Lancaster Environment Centre, and he's one of the team who takes daily readings from the Hazelrigg weather station.

Now that's part of the university, but it's also part of the Met Office set up...

Kan: …oh, wow…

Paul: …to get readings for the whole country. Measuring conditions such as the temperature, rainfall, et cetera in this area. James, welcome.

James: Hello. Thank you.

Paul: You've just come in from outside. What's the weather like outside?

James: Not bad, actually. [Jan laughs] Bit of sun, bit of cloud, not raining. So I can't complain.

Paul: And I have to ask, is this what you would've forecast?

[Jan laughs]

James: Oh, of course, yes. Yeah, without a doubt.

No.,I mean, it's actually been quite difficult this week. Well, I don't do forecasts, but the Met Office must have been struggling to judge whether one place would see sunshine or whether it stay cloudy. So we had a mix of days.

Jan: Yeah. And I suppose I, I was raised in New Zealand, so we were always obsessed by the weather because I was on a farm. And so Dad wanted to know, you know, what he could do next.

But because we sit out there in the Southern Ocean, when they say there's a cold front coming through, which is a, a southwesterly, you'd see the line of clouds and it would basically roar up the country and then it would be gone. And, you know, you had some nice weather.

Whereas when I moved here, I was amazed. This is really hard to tell 'cause there's so much effect from various other land masses and…

Paul: …yeah…

Jan: …et cetera. It's amazing.

Paul: Yeah, I think it's why we're all obsessed in this country with the weather…

Jan: …yes, indeed…

Paul: …it's a stereotype that's true.

Jan: Yeah.

Paul: Uh, and what about you James?

Can you tell us a little bit about yourself, your expertise and your background, and have you always been obsessed with the weather?

James: I'm afraid I have, actually, yeah. Um, well for a start, my dad worked for the Met Office…

Paul: …aha...

James: …so I remember just as a young kid, always asking what type of clouds are those? And so on. And how high up are they? And, and then, you know,

he'd bring back synoptic charts from work occasionally to show us. So I kind of got into it that way a bit as a, just as a hobby.

Paul: Mm-hmm.

James: But by training, I'm essentially a biologist. So when it came to choose what degree to do, although I was interested in weather and already concerned about climate change, in the end I decided to go with biology 'cause I had an interest in sort of plant photosynthesis and how plants interact with their environment. So that's kind of what I focused on there.

But then that led to me coming to Lancaster to do my PhD, which again was related to that because we were looking at, um, how increasing concentrations of atmospheric CO2 directly impact on plants, specifically with my PhD, tree water use…

Paul: …mm-hmm…

James: …so tree and forest water use obviously has big implications for the hydrological, and for climate model, as well as for forest health and tree drought tolerance.

Paul: Mm-hmm.

James: Um, so it was all climate related, but…

Jan: …but all connected together with that living system and the atmospheric system fluxing in and out the whole time?

James: Absolutely, yes, yeah. 'Cause, especially with the climate models at the time only just beginning to consider the interactions with the biosphere.

Jan: Yeah.

James: Whether that be in terms of water transfer or carbon uptake and so on.

Paul: So, because you are talking about your dad working for the Met Office, I just have images of Bill Giles and John Ketley and Michael Fish coming around for tea every once in a while.

Is that, I take that was standard?

[Jan laughs]

James: Uh, no, no, I mean. No, I think my dad was stuck in an office or out in a field taking measurements most of the time. So not, not live on TV.

Paul: Aaah.

Jan: And you're indeed out in the, the field a bit yourself. So tell us about Hazelrigg, um, in terms of what kind of weather station it is and what happens there and how, like how big is it?

James: Well, originally, the original Environmental Science department in Lancaster started taking measurements at first in the early 1960s. It was just basic measurements of temperature and so on.

But then fairly quickly over the next couple of years or so, they seemed to have built that up to the sort of full suite of basic parameters that you would measure at a Met Office run weather station.

And I don't know what stage it actually became officially recognised by the Met Office. Um, it could have been when it moved up from campus to Hazelrigg in 1976, because obviously at the time they must have realised the site on campus is gonna get surrounded by development as campus expands.

And if you are trying to set up a, a set of measurements to monitor long-term climate change, you don't want those changes you're looking for to be swamped by suddenly switching from essentially a rural to an urban…

Paul: …mm-hmm…

James: …environment, and you don't want obstructions nearby that will affect the measurement. So since then, it's, it's definitely been part of the Met Office network of sites which collect this data on a daily basis for them.

So it's actually, uh, technically speaking, it's a climatological station. So we…

Paul: …ooh, well, we got that wrong, didn't we?

Jan: Yeah. We'll have to write that down.

[Everyone laughs]

James: In the sense that, um, we don't take hourly measurements that feed directly into the forecast that the Met Office will give you for tomorrow or Thursday or whatever.

Um, but we do take daily measurements, so things like daily maximum, daily minimum temperatures, daily rainfall totals and sunshine totals. Those are the key things.

And also we make observations at nine o'clock each morning of things like cloud cover, cloud types, what the weather is currently doing at the site.

Jan: So that sounds like some of that could be automated, but some of it must be manual as well. What's the mix between those two?

James: Well, that's right. So the, those measurements I've talked about the long-term climate ones, they still use the manual instruments…

Jan: …wow…

James: …so that means that somebody physically has to be there 365 days a year to take those measurements.

Paul: To interrupt your Christmas dinner just to go, go and take your measurements…

James: Absolutely, yes. Yeah, I think this Christmas was the first one I had off since 2019, so…

[everyone laughs]

James: The point of those manual measurements, the reason that somebody has to be there *every day* is the continuity. So it's using the same instruments that have been used for decades and they're identical and set out in the same way across all the sites that the Met Office use for that data. So that's why we continue that.

But nowadays we have, most of that is also automated. So, as well as daily measurements, we've got a real time record of temperatures, rainfall on a 10-minute basis. So that is also really useful, especially for students and researchers in the University.

Jan: Well, how, how are the students and the researchers using that data?

James: So, obviously some people are working on climate itself, but, but even indirectly, I mean, anyone doing field work in the local area, whether that's ecology, hydrology. That data's very relevant to them.

Um, and that might be on the sort of climate basis, you know, how, how typical is this season that I've been working in compared to, to usual…?

Jan: …that makes sense, yeah…

Paul: …mm-hmm.

James: …or it might be very specific right down to the 10-minute level where they want to know exactly what the conditions were at the time they were taking specific measurements outside.

Jan: …wow…

Paul: So are there any measurements that are taken now that weren't taken back in the 1960s? I know you talk about there's now automated things in place for taking measurements, but are there any things that you measure that wouldn't have been thought about being measured back then?

James: I don't think so, no. Because we've always measured, as well as air temperature, soil temperatures, for example. Um, I'm pretty sure that there's nothing been added over the years.

If anything, some of it's been taken away, in the sense that they don't take so many different depths of soil temperature, for example, as they used to.

So we actually have somewhat more in the way of measurements than the Met Office require us to have as a minimum.

Paul: Ah, I see. So you're still taking measurements that aren't being asked for, um, as a requirement…

James: …by the Met Office? Yes. Um, that doesn't make them obsolete, of course.

Paul: …mm-hmm…

James: …'cause other people still use them.

Jan: Yeah. And this is when we should have done some homework, Paul. [laughs] 'Cause I, um…

Paul: … well, I asked you to go outside and look at what the weather was like and you weren't interested.

Jan: [laughs] I dunno if that's homework as such. So, the Met Office has these, these measuring stations all over the place. So when they talk, when you hear on like, this is the driest summer since records began and, and that sort of thing.

What, what does that mean since records began? Because if we've just had a station from 1960s, 1970s, there'll be other stations that are older in the UK and then other ones that are newer than, than our station as well.

James: That's absolutely right. Yes. So, um. Yeah, they basically have to do the best they can with what data they can get going from stations going back further.

And that will sometimes take them back into periods where things weren't done in the same standard way.

Jan: Yeah.

Paul: Mm-hmm.

James: So therefore you need lots of, um, really complicated analysis about how can you compare those temperatures from, you know, the early, uh, 20th century, or before that, with the more modern techniques that have been used.

So the, the standard data that we have nowadays, the standard instruments do go back many, many decades, but they don't go back all the way.

Jan: Yeah, yeah.

James: So there's been a lot of work behind the scenes looking at how historical measurements of temperature and so on can be equated to what the modern equivalent would be…

Jan: …ah, that's really interesting.

Paul: So how big an area then would Hazelrigg cover? I don't, I don't mean physically, how big is the weather station? But when it comes to estimating climate, et cetera, for a certain area, how big an area does Hazelrrig, is Hazelrigg considered, uh, a measurement for?

James: Well, um, that's a good question because of course it's not, it's not even representative of, say, Lancaster City Centre, for example…

Jan: …yeah…

James: …not just because of the buildings, but because of the topography. It's, it's up on a, a hill exposed to the wind and all the weather. So really its value is not so much in saying this is exactly what it'll be like one mile away, two miles away, five miles away…

Paul: …mm-hmm…

James: …it's more of how things are changing and it, it's used, so these climatological stations, I think they have about 150 odd around the country, but there's so much other data available as well to fill in the gaps.

So it, it, they will be aware of, you know, local microclimates in, in specific locations, for example.

Paul: Could you give us some examples then of how the information that you are providing can be useful? Um., you've mentioned some of the stuff that it might be useful for within the university, but how about by people like the Met Office and things like that?

James: Well, for a start, as I've mentioned, it's the long-term climate change monitoring. Um, that's its primary function, but equally important, um, they can use that, the data to validate their forecast models. So that's both the forecasts that you and I would use on a daily basis.

And also the climate models. So because we've got that historical data, they can essentially plug that data into the current climate models and see how well they do at predicting what's happening now, compared to what is actually happening now.

Jan: And something that, that James said that I think is really important, but which maybe is worth emphasising for our listeners.

So the weather and the climate are two separate things.

James: Yes, yes, yes…

Jan: …obviously, two related but separate things. And you'll be much better at explaining that than I am.

'Cause I could have a go, but I'm gonna make it, [James laughs] I'm gonna make a mess of it.

So, so how would you distinguish weather from climate?

James: It's essentially the timescale. So the weather is specifically exactly what it's doing in one location on one day. Climate is the kind of sum of all that over a whole year and then many years.

In other words, what is the typical weather at any time of year in any location?

Jan: Yeah.

James: Um, so the weather will change day to day, the climate will be changing on a more gradual long-term basis with lots of day-to-day and season to season variations.

Paul: So with Hazelrigg, having been going for 60 plus years, are you able to observe changes in the climate from Hazelrigg, or at the weather station at Lancaster University and then Hazelrigg?

Have you been able to observe changes in the climate over that time and in recent years?

James: Definitely. So, um, well for a start temperatures. They've been increasing in line with the global average of roundabout quarter of a degree per decade, which doesn't sound much.

But then the effect that has that has on extremes is massive. So against that backdrop of an ever warming ambient temperature, when we do get conditions for a heatwave, it's more likely to be much hotter than it ever was before.

Paul: Mm-hmm.

James: So if you look at the, the sort of top 1000 hottest days that we've ever recorded. They are four times as much like, more likely to be occurring now as they were even 10 years ago.

Paul: Mmmm.

James: So just within recent years, just within the last decade, there's been a significant increase in the frequency of those really, really extreme hot days.

Rainfall is, that's increasing as well…

Jan: …oh, right…

James: …especially over the winter. So again, there's a, been a 30% increase roughly over in winter rainfall. But again, it's the extremes that are really noticeable about that.

Paul: So, we're talking about climate generally, but just on about maybe individual or say monthly measurements. Have there been anything particularly striking over the time you've been there?

Um, you measure daily rainfall, you measure sunshine, you measure monthly, things like that. Anything over the time that you've been there, or that the station's been there, that's been observed, that really stands out to you?

James: Well, the one recently was of course, the day that several parts of the UK topped 40 degrees for the first time. And the, the really notable thing about that was, temperature records are normally broken by a small increment every time. So it might be a few tenths of a degree higher than it ever had been.

This. So many places broke their previous record by such a big margin. So if you look at Hazelrigg. Most of our previous records are clustered around about 30 degrees. There was one of, of about 31 and a half...

Paul: …mm-hmm…

James: …in 2019. The longstanding record was from August 1990 of 32. But then in 2022, of course we got 35.3 degrees. So a huge jump of over three degrees.

And I remember I had to go in early, so I was cycling through Lancaster about seven in the morning. And it was already 27 and a half degrees then, which is hotter than most days we'd ever get normally here in the summer.

Paul: Mm-hmm.

James: And it never got below 25 that night.

Jan: Yeah.

James: And…

Jan: …I think it's the nighttime temperatures that people find the hardest to live with, in a way…

James: that's…

Jan: …the hardest to live with, in a way…

James: …that's, yes, yeah, I remember 2018, I was sleeping downstairs for about six weeks 'cause the upstairs was just unbearably hot.

Paul: Mm And what about rain then? Have there been any particular measurements when it comes to it? 'Cause you said that the increases of. Been coming in winter with regards to rain. And I know here at Lancaster six, seven years ago, there were the really bad floods in areas around the university.

James: That's right. So, well, for a start there was storm Desmond in 2015, which was a, affected a much larger area of the country…

Paul: …mm-hmm…

James: …of course. Um, and that was the, the biggest single rainfall event we'd experienced at the time with 83 millimetres falling over about 30 hours.

And then of course, within two years, November 2017, we'd broken that record. We had about 95 millimetres in the same sort of 30-hour period, and that was more of a localised thing.

Um, so that, that was what was striking about that the sort of Lancaster, Carnforth, um, Morecambe, Silverdale area had far more, it seemed, than even the higher ground up over the, you know, Western Pennines, which would normally get more than we do.

Paul: Mm-hmm.

James: Um, so that meant that the, the problems locally were very severe, so it was reported on the news and everything. And of course the Met Office at the time was still saying, oh yeah, we had about 40 millimetres, but that was from 30 miles away somewhere.

Paul: Mm-hmm.

James: We had, you know, 73 in the 24-hour period.

Paul: What might be a standard at that time of year? I'm just wondering, 73 millilitres sounds like a lot, but I'm wondering what it would be.

James: That was November. So the normal monthly total for November is 115, something like that.

Jan: Yeah. And I think it's sort of, I find that description on, um, you know, when you're reading it in the newspapers or, or on social media about, you know, you know, like a monthly share and then what you get in a day is…

James: …mm-hmm…

Jan: …is, is often quite arresting. 'Cause you suddenly think, oh no, that's really a lot.

James: Yes. Yeah. And it's not just these two kind of one-off events. It's, if you look at the number of days that exceed, say 50 millimetres, 40 millimetres, that's massively increased over recent years.

Jan: Mm-hmm.

James: So like days over 50 millimetres, it was less than once a decade up until 2000. Then there were two in the 2005 in the 2010s, and another five since 2020.

Jan: Yeah, yeah.

James: So that says something. Without doing any statistics on it, you can see that, you know.

Jan: And, sort of a, the information's obviously shared into the Met Office and that whole sort of, you know, system-wide measures. Are things like Lancaster County Council, are they interested in that kind of data as well in terms of being able to plan responses to more localised events?

James: They, they are, I think. So, I know somebody who works in, you know, flood, flood management. Um, but it tends to go via the Environment Agency.

Jan: Oh, I see. Yeah.

James: Um, so I mean, the council will contact us sometimes for various reasons, but, um, but yeah, certainly the Environment Agency.

I, I mentioned the flooding of 2017 and the discrepancy between the rainfall that we had. And what was recorded 20, 30 miles away. So after that Environment Agency realised that to give a more rapid warning to the people in Galgate about imminent flooding, they should have a, a rain gauge as part of their own network, sited at Hazelrigg.

So that was one hopefully useful outcome out of the publicity surrounding that particular rainfall record.

Jan: Absolutely. It's not…

James: …it made them realise there was something they could do to help.

Jan: Yeah, that's really helpful. And um, 'cause we are sort of really interested in sustainability and business. So actually we've um, you know, talked about space weather, which again has a, you know, risk, continuity, resilience kind of angle to it.

And this is the same sort of more local, but, but in some ways actually is still really material resilience for local areas.

James: Yes. Yeah.

Paul: Yeah. I don't think you can get any less local than the weather in space.

[Everyone laughs]

Paul: So yes, this is slightly more local than what's going on as, uh, you know, solar flares leave the sun.

Jan: Yeah, yeah…

Paul: …so, so…

Jan: …we're bimodal, we're kind of interested in the middle as well, but we've had the two ends of the, the spectrum here.

Paul: Do you think, James, it's becoming harder to predict what's going to happen. You've got all of these measurements and you say things that previously used to be once in a decade become twice in a decade, become five times in a decade, become who knows how many times in a decade.

Is it harder to predict what's going to happen?

James: I think yes. I mean, well, I should just mention if you're talking about the short-term weather forecasts for the next few days or a week or so, they've improved because there's so much data available. The computing power has increased massively, and the forecast models have improved due to, you know, fundamental research into the whole system.

But when it comes to sort of longer-term changes, if you like, we are, we've already caused so much change that we're kind of entering uncharted territory when it comes to the climate models having to receive data, which we, you know, conditions that we've never seen before. Um, things like the extent of ice melting in the Arctic in the summer, for example.

Paul: Mm-hmm.

James: So that's another reason why the fundamental research is so important in understanding those processes.

So yes, in that sense, because of the changes we've already caused and the further changes we're likely to cause we don't know for sure exactly what to tell the climate models, if you like.

Jan: Yeah.

James: And, yeah, and I added to that. There's course, there's so many potential tipping points where we set in train a process of events that becomes sort of self-sustaining and irreversible.

Jan: and when you're looking at Hazelrigg and other people looking at their own sites, would they be able to recognise the tipping point?

I mean, how would you know if it's just, oh, that's unusual or…

James: …well, that's…

Jan: …we've gone over?

James: Yeah. So, I mean. One thing might be sort of glaciers in the European Alps, I mean…

Jan: …right…

James: …personally I think it's got too far that that can be reversed, because. Okay, warming and lack of precipitation sets off the glacial retreat…

Jan: …yeah…

James: …but then you've got more and more exposed rock, which heats the surface more and it just carries on.

Jan: Yeah.

More melt water underneath to lubricate the movement of it. So it kind of, once you've set that process in train, it's difficult to reverse without a, you know, a huge increase in precipitation and or drop in temperature.

Jan: So when we are talking about, you know, the information going to the Met Office and going to the Environment Agency, these are sort of, these are public institutions, which if you like, you know, generate data for the common good for us all to understand what's going on.

But, um, insurance companies just came into my mind because, um, and there's sort of headlines in the, the news in the last couple of days that some places might become uninsurable.

So how do the insurance companies know about this? Do they buy data or is it the same data, or is it then customised for their needs?

James: I don't know. Possibly via the Met Office…

Jan: …right.

James: Yes. On a more local level though, that has been helpful to individuals because the insurance company has got data from, again, somewhere far away.

Jan: Ah, yep.

Paul: Mmmm.

James: So somebody up the road had their chimney blown off a couple of years ago, and the insurance was saying, well, no, the wind wasn't particularly strong.

They had data from Fleetwood, which was nothing like what it was like up on that ridge above the university. Uh, we had double the wind speeds there.

Jan: Aah. So if I ever get in trouble with my insurance company…

James: …if you get in trouble with your insurance, I could be the person…

[Everyone laughs]

Paul: …yeah…I'm sure he can fiddle the figures just to, you know…

Jan: …I'm sure he wouldn't, if he's a responsible scientist…

[Everyone laughs]

Paul: …if you climb up on the, the roof just to push your chimney over and then blame the winds. Yeah, yeah…

Jan: ..yeah. That's, it's also the, the setting of, you know, sort of all good, uh, you know, TV detective programmes where someone goes, ah, but the wind speed was, and it came from this direction. And suddenly, you know…

Paul: [incredulously] What, what detective programmes have you been watching where the detective has gone and got the wind speed measurements?

Jan: Oh, ah…

Paul: …was it Howard's Way: The Murders, or what? I don't know…

Jan: [laughs] …it's something called High Potential, which is a really, I've just started watching it and just sort of, it's sufficiently trashy, 'cause I can't concentrate very much in the evening 'cause because by then I'm too tired. But there's, this lady was looking at a picture going, no, who the windspeed, you know, the wind was from this direction.

[Paul tuts loudly]

Jan: [mock defensively] So it's, it's true in stories, that's all I'm saying. I'll get back in my box. I'm terribly sorry, listeners.

Paul: [makes sceptical noises] Yeah, okay. Moving on.

With regards to Hazelrigg, do you think there's anything that might change there with how you're measuring and what you're measuring?

James: In terms of what we're measuring, I would say that probably would depend on individuals wanting to install new instrumentation. So, so there are various other things we could measure up there.

You mentioned space weather before, I mean…

Paul: … mm-hmm…

James: …Physics already have a magnetometer up there. Although that no longer feeds directly into the automated Aurorawatch alerts since a lawnmower set it off, and sent the whole country a red alert for Auroras.

[Jan laughs]

Paul: That's magnificent! [Everyone laughs] When we had the head of Aurorawatch in here, he never mentioned anything…

Jan: …he never said…

Paul: …about lawnmowers…

Jan: …yeah…

James: …I think it was, I, I, it was me that got in touch with him to say, I don't think that's real. [everyone laughs] Because I'd just seen the guy driving round and round it with his, uh, tractor.

Jan: Heavens, heavens. That's ground truthing in a real way.

James: Um, but yeah, in terms of the measurements, I mean the Met Office, they've mentioned automation before. They've said there's no way it's happening anytime soon.

But you can see at some point it's likely to, because at the moment they're relying on sites like this, which it does totally depend on somebody being there every day.

Paul: Mm-hmm.

James: We, sometimes it's individuals using their own land. In this case it's the University and we've got a team of volunteers to help out, so I don't actually have to be there 365 days a year.

Um, but yeah, it's, it's a big ask for a lot of people and they want the continuity. So if somebody's been doing it for 20, 30 years and they can no longer carry on, then that site might be lost. But if it's all automated…

Paul: …mm-hmm…

James: …so long as they can get a standard set of kit, I suppose that's calibrated, if you like, against that backdrop...

Jan: …mm-hmm…

James: …of manual measurements, which have existed for decades. So you know, you are comparing like for like, or can adjust for that change. At some point it probably will go automated, but maybe not in the timeframe that I'm doing it.

Paul: So within your team, have you got people who've been there for longer than you who passed on the knowledge, who then you pass on the knowledge to people who join after you join?

So you've got that continuity within that of the people taking the measurements?

James: Yes, yes. So my previous line manager trained me up. He's now retired. And it would've gone like that before, I suppose. Yeah.

Paul: Mmm, mmm.

Jan: I really like that idea of that continuity of people dedicated to being exact. To being consistent, bringing experience to it, and actually feeding into that really important information infrastructure to allow us to do other things.

Paul: And it's hard to predict, as we've discussed, what's gonna happen to the climate.

Personally, what do you think might happen with the climate around Lancaster?

James: Well, I think essentially we can be pretty certain that for a long time to come, even if we cut emissions overnight, I think we're gonna see an increase in the frequency of the extremes of temperature, extremes of rainfall.

Uh, but not just extreme rainfall events. Also more prolonged periods of drought. So, for example, recent years, you know, we had 22 days without rain in 2023. And then this spring, which was a record breaker for, uh, heat and sunshine and almost for rain of, or lack of rainfall, you know, 31 days without, uh, without rain.

And so that kind of cycle of one extreme to the other, where you've got either prolonged dry, prolonged very wet periods, that's not good because, well, it's not good for the ecology of the rivers for a start…

Jan: …mm-hmm…

James: …it's not good for ecosystems and wildlife in general. It's not good for agriculture, it's not good for our water supplies. And of course it's not good in terms of increasing flood risks when it does rain.

So, sorry to be so gloomy, but, uh…#

Paul: …no, no, that's fine…

Jan: …we've had, we've had…

James: …on a happier note, sunshine totals are also increasing slightly over time, so…

[Everyone laughs]

Jan: …it makes us all, it makes us all happy. We notice it, yeah.

Paul: If James had come up with some kind of forecast for the climate, that was particularly positive, oh, it'll all be fine, I don't know if I'd have believed anything he'd said for the previous half hour in this conversation. So it's good that you've, uh, yeah, said that.

James, it's been a really fascinating conversation. Thank you so much for coming in to speak to us.

James: Well, thank you for asking me.

[Theme music]

Paul: I 'm really disappointed, Jan, because we still don't know what the weather's like outside.

Jan: [laughs] I suppose so. But what I found really interesting, uh, from that conversation is the extent to which in all of these, about 150 sites across the UK, and then multiply that up by countries and, and you know, the whole globe.

There are people that are going out each morning and doing a dedicated set of standard measures. And *all* of that feeds into everything that we might need to know about, you know, weather, weather forecasting, but also the climate predictions as well.

Paul: And while some of it's automated, some of it's done manually, which makes me question if the Norwegians are really pessimistic, [Jan laughs] and their measurements when they make them really pessimistic.

Jan: Yeah…

Paul: …so therefore, is the Norwegian forecast for Norway even more pessimistic than the Norwegian forecast for somewhere else?

Jan: I don't know. Have you ever met a, a cheerful Norwegian?

Paul: I've met a few Norwegians and one of them was reasonably amicable.

Jan: [laughs] For the richest country on earth, that's not a very good recommendation.

No. So I…

Paul: …they're very down to earth is what I would say.

Jan: Well, down to, down to earth and rain and…

Paul: …down to under the soil where you have to take temperature measurement…

Jan: …temperatures, et cetera.

So I think also it's quite interesting to realise who the data is shared with, both in terms of business use, um, local council use…

Paul: …mm-hmm….

Jan: …so that, that we can manage things. But then I was all, also like really made up by, you know, somebody being told that it can't have blown that much, but could go back to the records and say, here it did. And so I think that particular nature of what's going on is really important.

Paul: It really emphasises the importance of *local* data and almost hyper-local data. Because that's someone who's in Lancaster, and getting a measurement from Fleetwood, which if you were to draw a line, 10, 15 miles…

Jan: …yeah…

Paul: …something like that, in a straight line. But those 10, 15 miles, what's happening in between them, that is so different.

So getting these hyperlocal measurements and being able to actually, yeah, it wasn't windy in Fleetwood, but look up here at Hzalerigg. There were two men who'd got blown off a hill and landed in Yorkshire. [Jan laughs]

You know, this is how important it's to have these people, these stations, these measurements in place.

Jan: And for almost anything you can think about, there's a lot of complicated behind the scenes technical stuff going on…

Paul: …there is…

Jan: …so we're able to, to move forward. That was, that was fantastically interesting.

Paul: It was, yeah. It is technical. Me and you probably couldn't do it. The fact James said he was taught by his predecessor, he will teach his successor, and there are going to be standardisations of the measurements, 'cause different people are gonna measure in different ways if you don't teach them, and therefore…

Jan: …absolutely…

Paul: …yeah. If James left next week and no one had been taught what James did, it might suddenly be that all the measurements from Lancaster, from

Hazelrigg became weirdly different, and they're saying, God, what's going on in Lancaster? [Jan laughs] The climate's changed in the space of two weeks.

Jan: Yeah.

Paul: And it's just because the person who's forward on didn't know exactly how these measurements are taken.

Jan: I'm pleased, I'm pleased we've got James with us.

Paul: Yes, I am as well. It's really interesting seeing what's going on there. And seeing how the, the climate change can be measured.

Which when it comes to sustainability, it's probably the thing that people think about most, is climate change.

Jan: Yeah, that's true. That's true.

But also we all think about the weather, and so making the link between one and the other is also kind of important.

So next week, are we gonna stay really local?

Paul: No, Jan. It's not quite local unless you consider West Africa to be in our neighbourhood.

Jan: I suspect what we do will have influence in West Africa, so not our neighbourhood, but it'll be an interesting story, nevertheless.

Paul: Yes, 'cause we're gonna speak about food security in West Africa. And we're gonna be speaking to Professor Christina Hicks, who's from the Lancaster Environment Centre, just like James, and he's gonna be followed by one of his colleagues.

So yeah, Christina's gonna be telling us about that, something not quite on that local level.

Jan: Brilliant.

Paul: Well until then, thank you very much for listening. I'm Paul Turner.

Jan: And I'm Professor Jan Bebbington.

[Theme music]